Dashboard development and implementation for USAID local partners

Data for Decision-making: Part 1- Demand and Use of Data

Date: November 15, 2022

Right to Care: Strategic Information

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Knowledge and skills gain

From the presentations, participantswill:

- Understand the PEPFAR reporting requirements and the required preparatory analysis planning
- Understand how to gather stakeholders' requirements for data presentation
- Learn about the different charts available and how to choose the right one for their programme
- Comprehend how to manage different data types and the systems available for processing and presenting data
- Learn how to use geospatial techniques and advanced data analytics for evidence-based programming

Outline

Day 1

- PEPFAR reporting requirements, data analysis planning and examples of operationalising surveillance systems for impact
- Development of Data Management System: Data Demand and Gathering User Requirements Specifications
- Data visualisation: Choosing the right charts

Day 2

- Methods for data, collection, storage and processing
- Demonstration of Excel and ADC Online Dashboards
- Advanced Data Analytics
- Geo-spatial planning and Use

Data to Action framework and Situation Room Approach

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November 2022

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Using program data at USAID- Rationale

USA D through the U.S. President's Emergency Plan for A DS Relief (PEPFAR) is at the forefront of utilizing data to advance development programming to meet the needs of beneficiaries and partner countries.

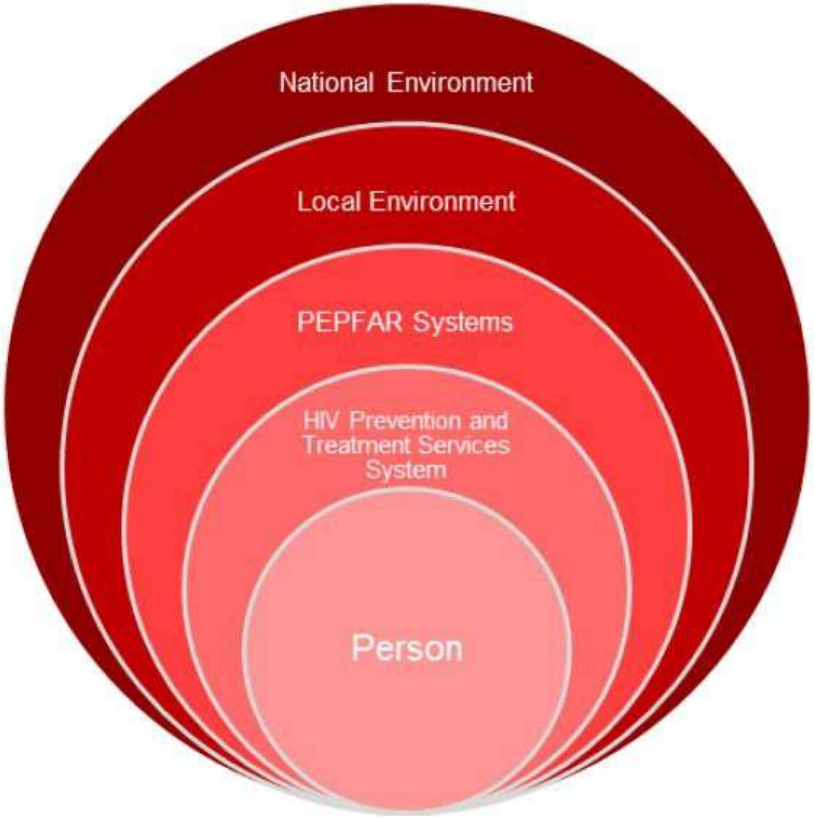
•USA D supports PEPFAR's approach to:

- Use granular data and analytic tools and insights to respond to real-time challenges and nimbly adjust programs;
- Advance evidence-based targeting and planning informed by epidemiological and program data;
- Enhance capacity and a data use culture to strengthen program accountability and management; and,
- Strengthen program monitoring to increase impact and save lives.

What are PEPFAR reporting requirements and expectations for implementing partners?

A person-centred approach through:

- Understanding ART patient outcomes and continuity of treatment in the era of differentiated care (i.e., TX_ML, TX_RTT)
- Indicators (i.e., HTS_RECENT) that allow programs to better understand clusters of recently-infected patients and spur programmatic action
- Outcome-focused cascade analyses (e.g., index testing, prevention)
- A continued commitment to ensure data disaggregation
- **Ensuring COP-funding for health information systems projects is impactful and supports: (1) interoperability between systems; (2) the adoption of standardized disaggregations; (3) shifts away from paper-based to electronic reporting; and (4) the adoption or expansion of HIV surveillance systems for public health response**



Source: PEPFAR MER Guidance 2.6.1

Indicator reporting frequency and the PEPFAR fiscal year

Source: PEPFAR MER Guidance 2.6.1

Evolution of PEPFAR Finer Age Bands for Results Reporting

Evolution of PEPFAR Finer Age Bands for Results Reporting									
FY 2015 – FY 2016		FY 2017		FY 2018		FY 2019 – FY 2022		FY 2023 TX & VLS indicators only	
Age	*Sex*	*Age*	*Sex*	*Age*	*Sex*	*Age*	*Sex*	*Age*	*Sex*
<1	M / F	<1	None	<1	None	<1	M / F	<1	M / F
1-4	M / F	1-9	None	1-9	None	1-4	M / F	1-4	M / F
5-9	M / F					5-9	M / F	5-9	M / F
10-14	M / F	10-14	M / F	10-14	M / F	10-14	M / F	10-14	M / F
15-19	M / F	15-19	M / F	15-19	M / F	15-19	M / F	15-19	M / F
20-24	M / F	20-24	M / F	20-24	M / F	20-24	M / F	20-24	M / F
25-49	M / F	25-49	M / F	25-29	M / F	25-29	M / F	25-29	M / F
				30-34	M / F	30-34	M / F	30-34	M / F
				35-39	M / F	35-39	M / F	35-39	M / F
				40-49	M / F	40-44	M / F	40-44	M / F
						45-49	M / F	45-49	M / F
50+	M / F	50+	M / F	50+	M / F	50+	M / F	50-54	M / F
								55-59	M / F
								60-64	M / F
								65+	M / F

Source: PEPFAR MER Guidance 2.6.1

Why do PEPFAR partners need enhanced data management systems?

- At present, the majority of PEPFAR countries are limited to programmatic aggregate data and periodic surveys to describe the HIV care continuum. With greater emphasis on patient-centered monitoring comes a need to understand patient-level data beyond the aggregate indicators
- Periodic surveys offer individual de-duplicated data, denominators, and the 95-95-95 cascade, but are cross-sectional (one point in time) and are expensive to conduct
- Standardized health data surveillance systems offer countries a mechanism to complement aggregate reporting systems and surveys with quality HIV data that emphasizes individual de-duplicated data to more accurately report the 95-95-95 cascade
- These surveillance systems can offer partners the ability to:
  - emphasize case finding and case reporting of new diagnoses (including recent infections)
  - identify if the newly diagnosed are linked to treatment, and
  - provide disaggregation by age, sex, geography, and risk

- ***Establishing such systems require a great deal of planning***

Source: PEPFAR MER Guidance 2.6.1

Why is it important to conduct data analysis planning?

- It is the first step in ensuring data quality
  - *Completeness, Validity, Timeliness, Reliability, Integrity, Precision*
- Helps define expected standards for quality data
- Helps your organisation determine how to present your data to various audience types
- Helps with developing data management tools that respond to data needs
- A plan will make your reporting efforts more efficient, effective, and lasting
- A plan makes everything easier. If you spend some time planning at the beginning of an effort, you can save a great deal of time later on, because you know what you should be doing at any point in the process

Putting project stakeholders at the centre of defining information needs: Identify your internal and external stakeholders

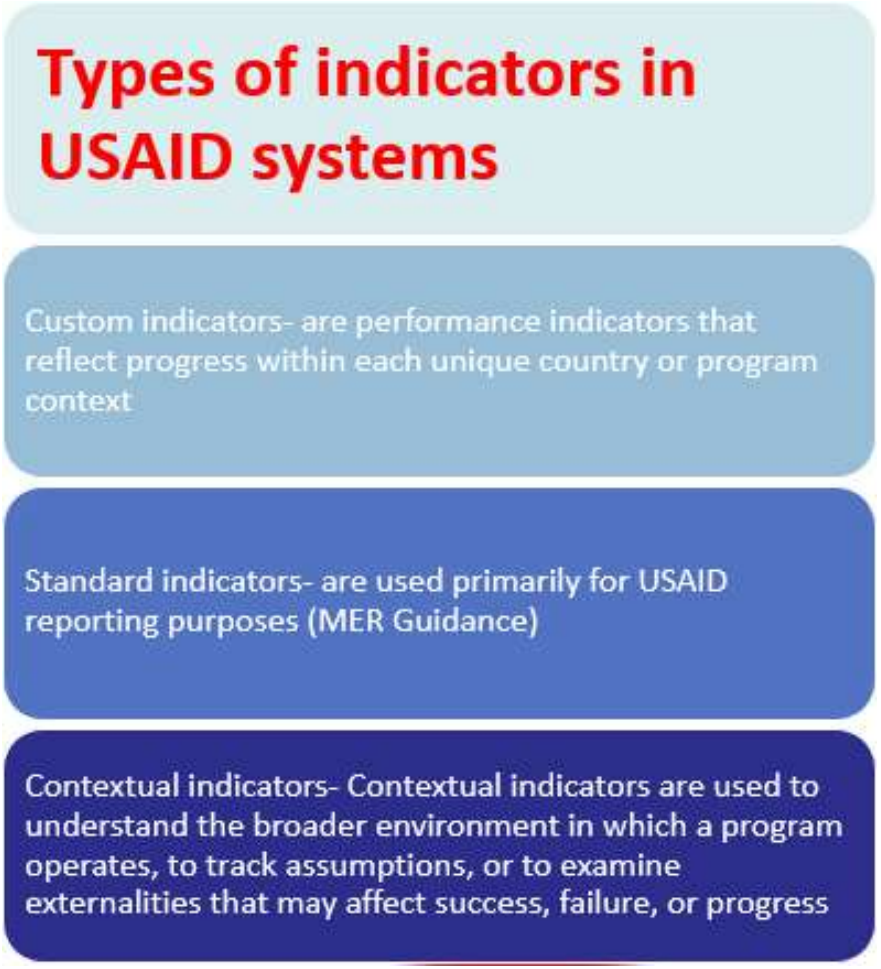
Audience Analysis tool

Audience	Audience Background (Knowledge, Experience, etc.)	WHAT information is required (audience needs and interests)	WHY is the Information required	WHEN is the Information required	How Information will be Communicated (Format)
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•

Handout 1- Audience analysis tool

Develop your indicators

RTC presentation 1- Hnadout 2- USAID- Selecting_performance _indicators



Illustrative questions to guide data analysis

- Comparing actual performance against targets. (Were targets met? Why or why not?)
- Comparing current performance to the previous year (How does this reporting period's performance compare to the last reporting period? Are we on track?)
- Comparing current performance to baseline (Does performance demonstrate a shift from the baseline?)
- Using acceptable standards to make conclusions about performance
- Analyzing trends in performance (What are the common themes and how does it compare to what is happening in the external environment?)
- Examining data for the unanticipated (What happened that we did not expect?)
- Examining data in relation to the critical assumptions (Did our critical assumptions hold during the performance period?)

Resource and structural requirements for setting up an enhanced surveillance and data management system

THE FOUR STRATEGIC PILLARS

- Monitoring & Evaluation
- Business Solution & Innovations
- Data Analytics
- GIS and Planning

Digital health systems: Development, enhancement and scale-up to transform and improve client care processes

Data analytics including GIS Spatial Mapping that pinpoint gaps and inefficiencies allowing for Geo-targeted solutions

Near to real time data driven decision-making that supports cost effective precision programming

Data standards and governance structures that optimize investments and ensure data quality and security

Data to action pathway for effective data management

At present, the majority of PEPFAR countries and implementing partners are inundated with multiple data sources of multiple data variables that remain fragmented.

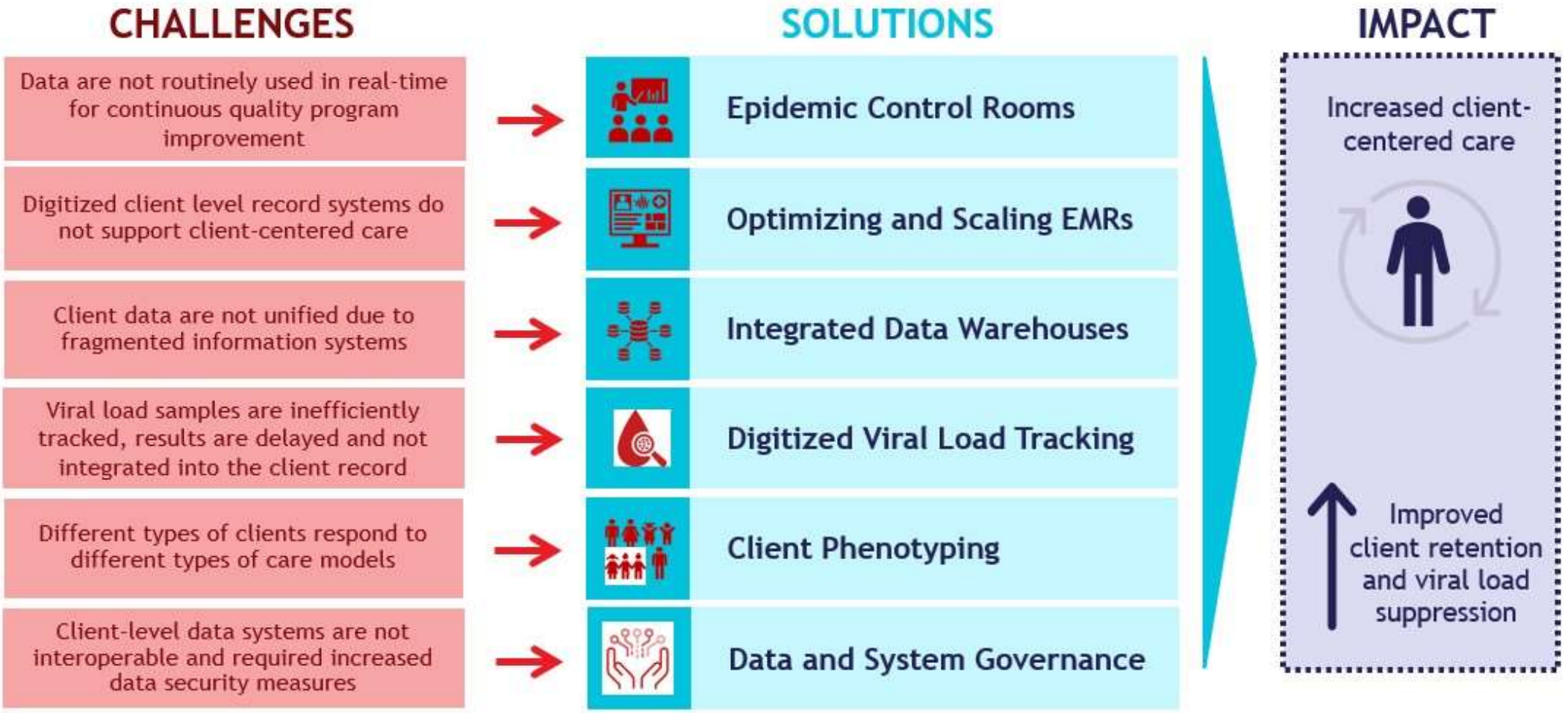
This results in limited capacity to draw insights from the data and poor programmatic decision making

What if we could build a common data dictionary?

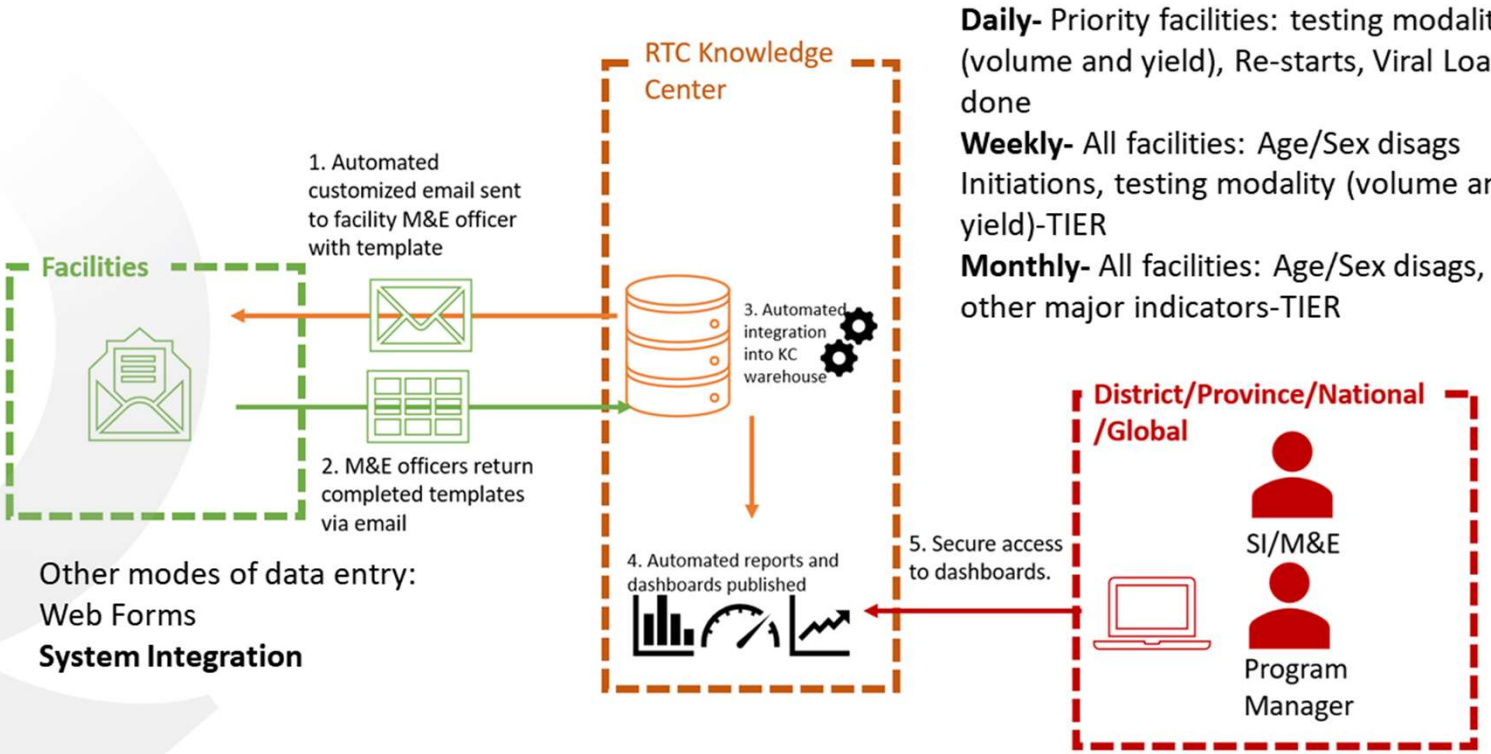
What if we could have an interoperable system for data integration?

What if we could build analytical algorithms for a data deep-dive?

Typical challenges and data management solutions for USAID implementing partners



Automated data collection and integration drives real-time daily reporting



Daily- Priority facilities: testing modality (volume and yield), Re-starts, Viral Loads done

Weekly- All facilities: Age/Sex disags Initiations, testing modality (volume and yield)-TIER

Monthly- All facilities: Age/Sex disags, all other major indicators-TIER

- **RTC is able to compile with PEPFAR/USAID reporting requirements at low SI/M&E cost**
- **Only platform to provide real time data by modality for precision programming**

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Examples of how to build enhanced data management systems and programme impact

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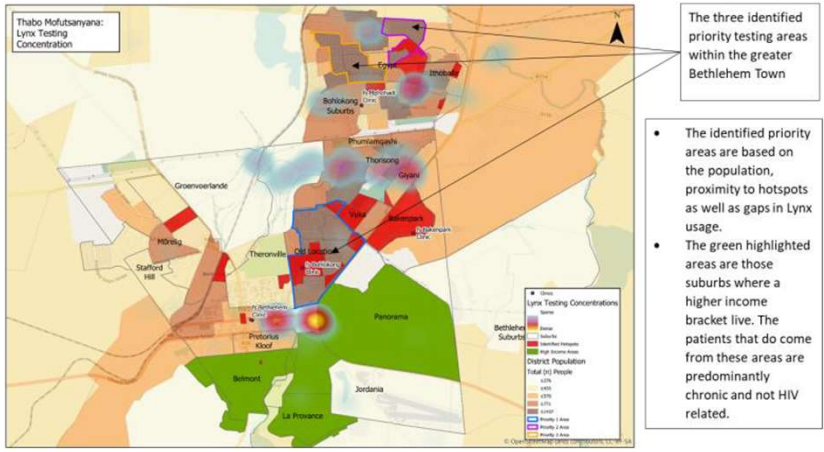
Example 1- Enhancing HIV case finding through HIV real time testing surveillance

Problem definition:
After a year of implementation community H V testing interventions, Right to Care's local partner in South Africa's yield fell below targets across the quarters with a maximum yield of 7% in an area where the HIV prevalence is known to be amongst the highest in the country

Intervention
HIV real-time testing surveillance using a mobile health application to collect geolocation data
Geospatial mapping was conducted using data collected using a mobile application called Lynx Health Application. Lynx data was used for creating GPS-based hotspot maps. The maps were used to target testing within the district, leading to an increase in HIV testing yield. Lynx data was specifically used for the following:

- Mapping Hotspots for women of reproductive age to improve case identification in children (to identify children through their caregivers).
- Mapping of Hotspots for Male children aged 10 – 14, to improve case finding in this age group
- Expansion of case finding strategies through mapping of physical infrastructure such as schools, football pitches and churches.



Results
RTC local partner XXX's case finding improved from 7% in COP 18 to 27% in COP20

Example 2: Operationalising the Situation Room approach- What is it?

Situation Rooms

HIV Epidemic Control Rooms allow decision-makers to analyze data in real-time for continuous program improvement supported by change management practices

- Source of data & process of collection is as equally important as the 'dashboard'
- Requires behaviour change & leadership from senior managers
- Surveillance of indicator trends-high frequency data is updated with more stable source data
- Daily data review meetings with Program Managers, SI/M&E, & Ops
  - ***Which facilities are performing & why***
  - ***Which facilities are underperforming & why***
  - ***Shifts from interventions & resource needs***

Game changer: Inclusion of Health Ministry teams and setting up Ministry daily situation rooms to review data together with RTC teams (training on the Knowledge Centre use was provided to district health technical teams by RTC)

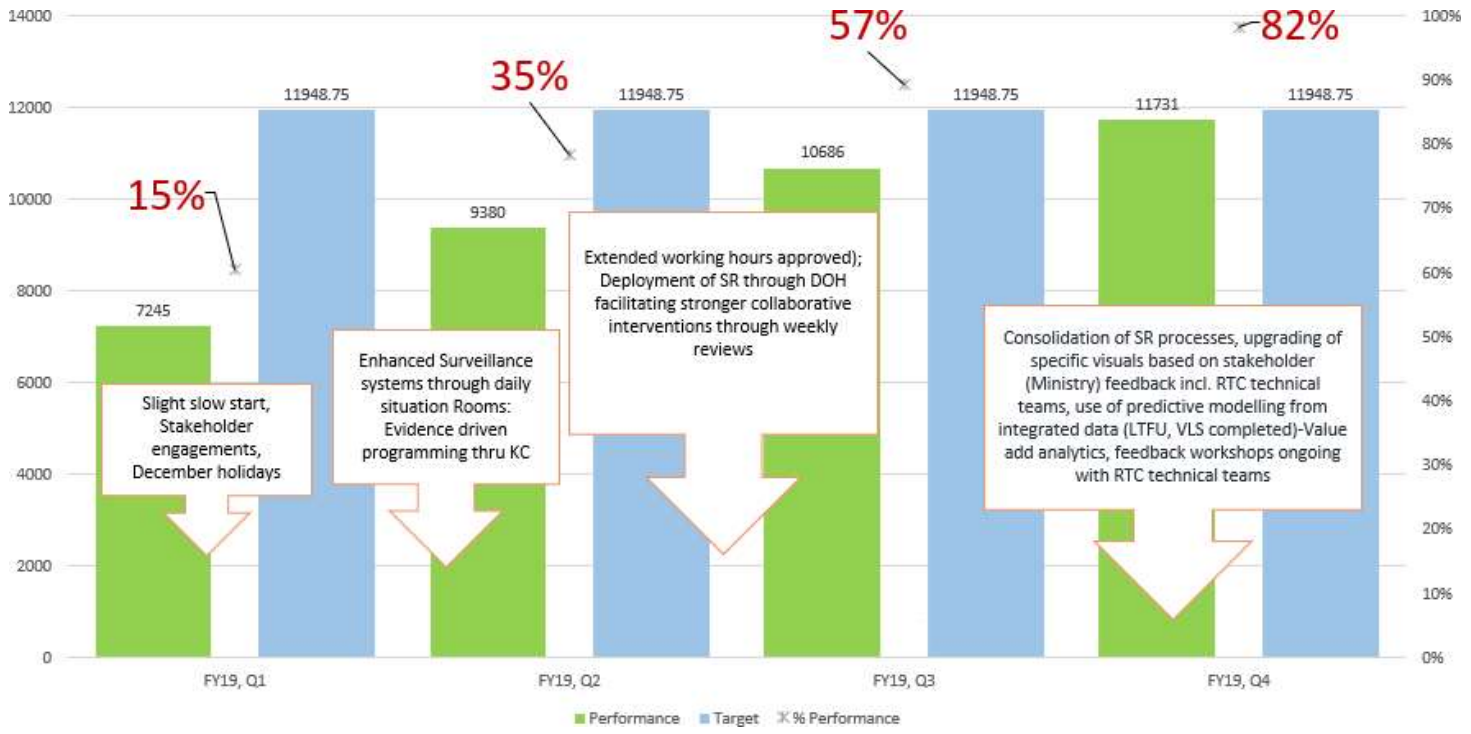
Impact: Routine data reviews in the situation room have contributed to improved outcomes

Leveraging the Knowledge Centre (as a data integration system) for daily performance review, a RTC partner in the Ehlanzeni District of South Africa realized the following results:

- 6% increase in TX_CURR between March and May 2019
- 35% increase in average daily case finding
- 32% increase in Net_New/New Ratio

RTC's Knowledge Centre facilitated identification of targeted interventions driven through real-time data availability and use

Daily Situation Room approach enhanced decisions and actions for TX_NEW



Improving programme performance through data analytics in Malawi and Nigeria

Optimizing and scaling electronic medical records

THE SOLUTION

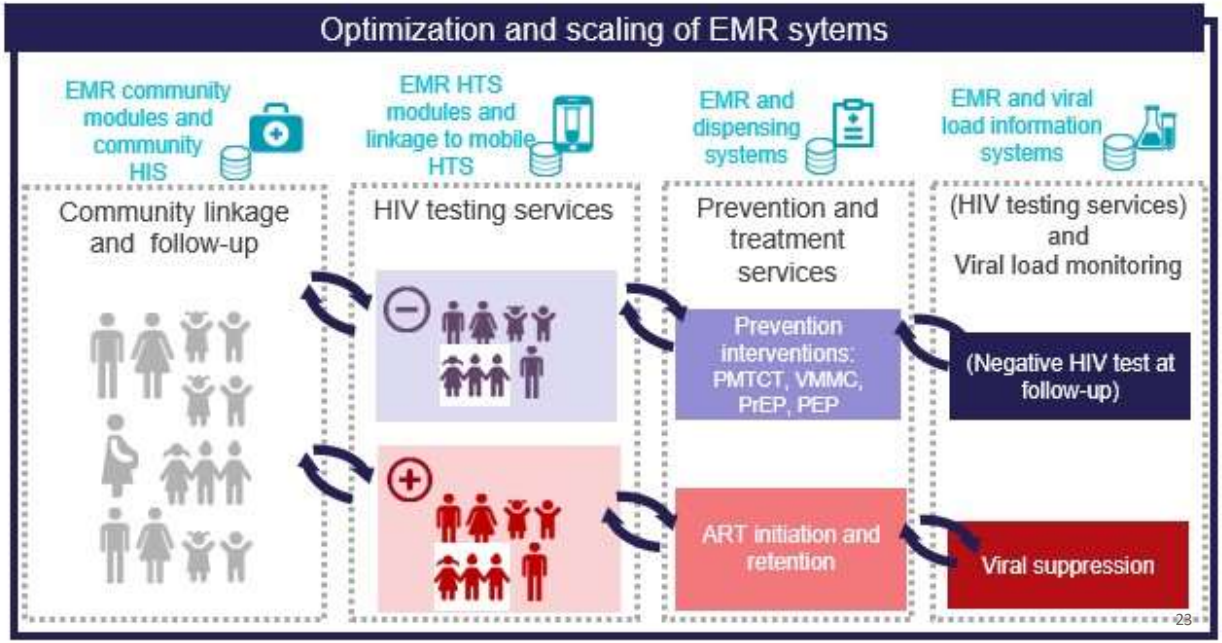
EMR Optimization

EMRs track clients across the continuum, generating data for improving clinical care and ultimately informing client-centered approaches and enabling cohort analyses and program monitoring

In Malawi, South Africa & Zambia, RTC has scaled up EMR usage

RTC has supported countries to optimize and scale EMRs by:

- Assessing existing EMRs for optimization and scale
- Aligning EMRs to treatment guidelines and reporting requirements from PEPFAR and countries
- Architecting, networking and interoperating systems for exchange of information across community, testing, facility, dispensing and lab systems
- Supported data for action frameworks and differentiated care models
- Providing implementation and user support
- Facilitating data driven linkages between community and facility systems through client scheduling and outreach for early missed appointments



Value Add Analytics: Insights Data Application

Client Phenotyping

- Targeted Patient Interventions
  - ❑ Create Risk Score for patients for predictive targeted interventions i.e., patients most likely to default on treatment
    - Based on all historical data
  - ❑ Determine what factors influence patients in defaulting
    - Outcomes will be used to improve patient care and remove barriers to remaining on treatment
  - ❑ Use algorithm output to provide targeted interventions and feedback into programs (down to facility)

E.g., We applied predictive machine learning algorithms to anonymised, patient-level HIV programmatic data from two districts in South Africa, 2016-2018. We developed patient risk scores for two outcomes: (1) visit attendance ≤ 28 days of the next scheduled clinic visit and (2) suppression of the next HIV viral load (VL)

Collaboration with HE2RO and BU

WHY DO TODAY'S PROGRAMMES NEED TO INTEGRATE DATA?

THE SOLUTION

Integrated Data Warehouse

A central data warehouse matches client records and unifies data across disparate systems, providing comprehensive data for program management, predictive analytic and cohort analyses

Centralized Warehouse

- Consensus and standards building for interoperability
- Ingestion of data sources from across the HIV continuum
- Data security protocols aligned with country regulations

Customizable Data Visualizations and Reports

- Real-time program analytics and access to high frequency data
- Customizable and interactive dashboards for use in Epidemic Control Rooms
- Pre-programmed PEPFAR/MOH reports

Surveillance and Predictive Analytics

- Client matching and de-duplication across the HIV cohort
- Cohort analyses for assessing longitudinal outcomes and true LTFU
- Case-based surveillance

Right to Care Knowledge Centre Demonstration

Data drill down

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Question and answer session

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Data demand and User Requirements Specifications Gathering

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November 2022

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Overview

1	Data Demand: Determinants of Data Demand
2	Developing dashboards for monitoring programs: User requirements gathering
3	Documenting Specifications
4	Dashboard Implementation – User Acceptance Testing

Data Demand and Use Defined

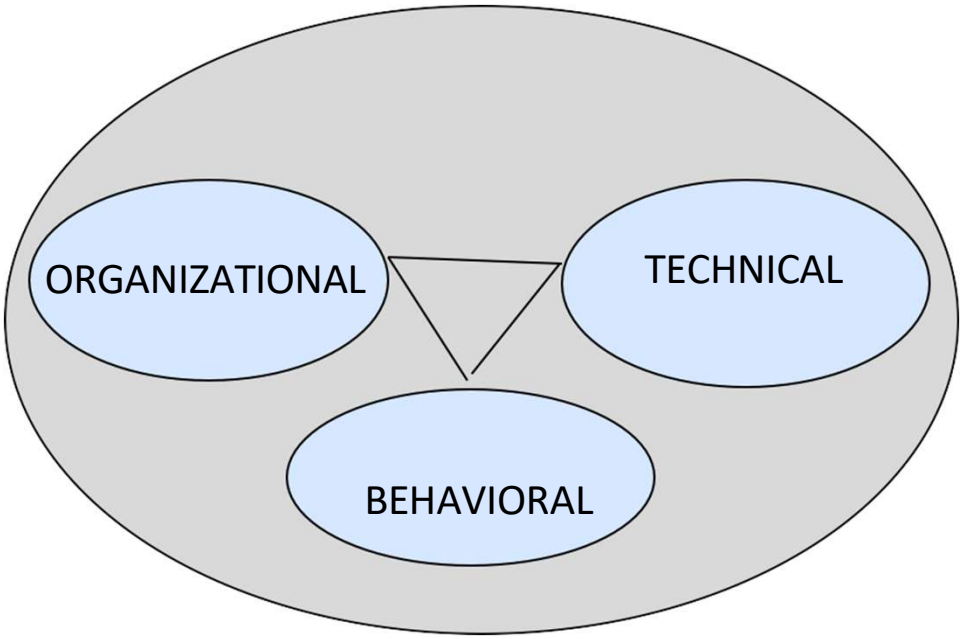
- Data Demand – When decision-markers specify what kind of information they need to inform the decision-making process and then seek it out

- Data Use - We define data use as instances where data are reviewed to inform a recommendation for action in strategic planning, policymaking, program planning and management, advocacy, or delivering services

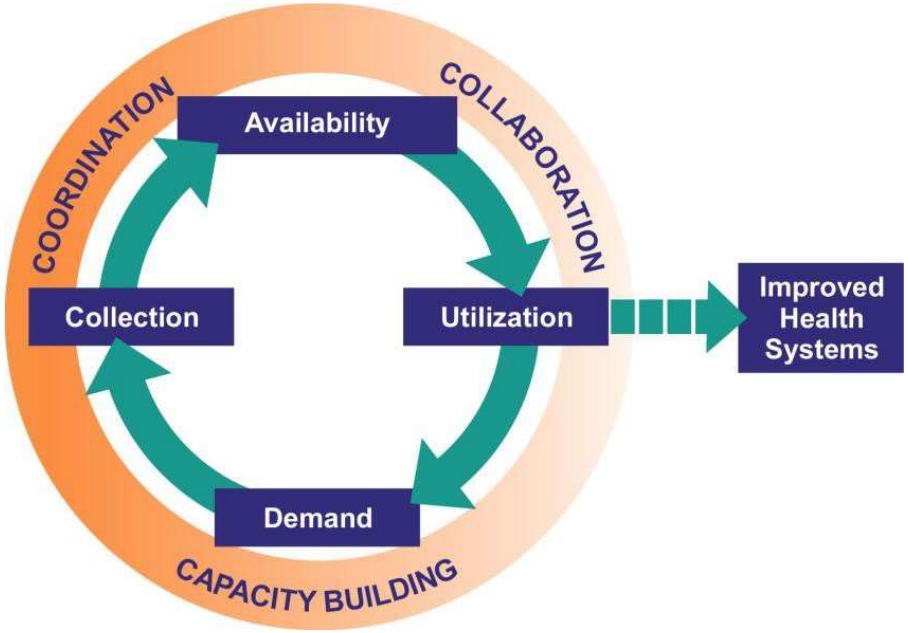
  - Allocate resources
  - Monitoring of the project
  - Create or revise a program or strategic plan
  - Inform policy (advocate for /revise a policy)

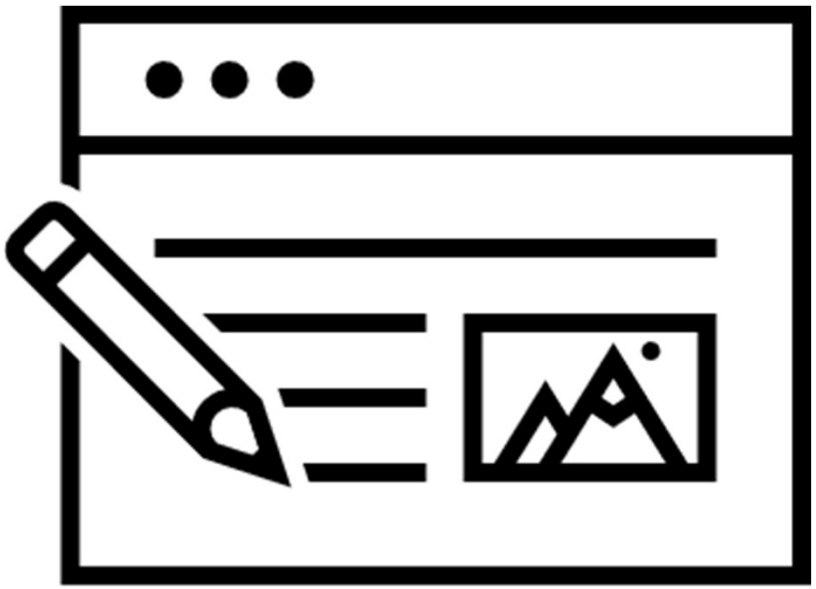
Determinants of Data Demand

Factors that affect the decision-making process



The use of data is linked to demand for quality information (conceptual framework)



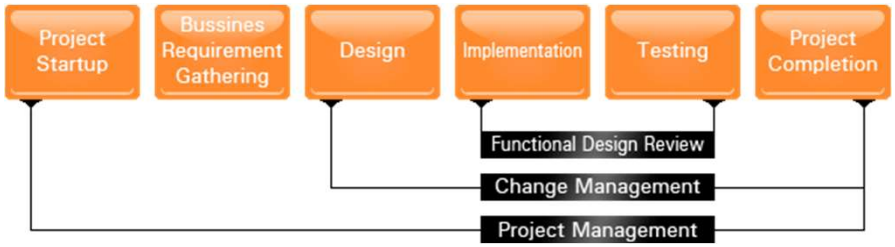


Development of Tools (Dashboards) for Monitoring

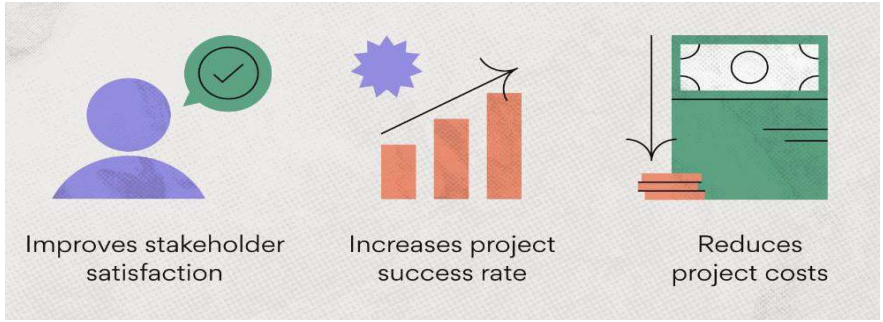
Purpose and Benefits of URS

- The URS describes the business needs for what users require from the system.
- User Specifications are written:
  - Early in the process, typically before the system is created.
  - By the system owner and end-users, with input from Quality Assurance.

- Process of dashboard development

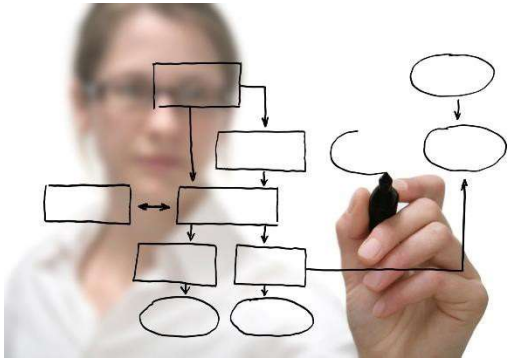


- Benefits of URS

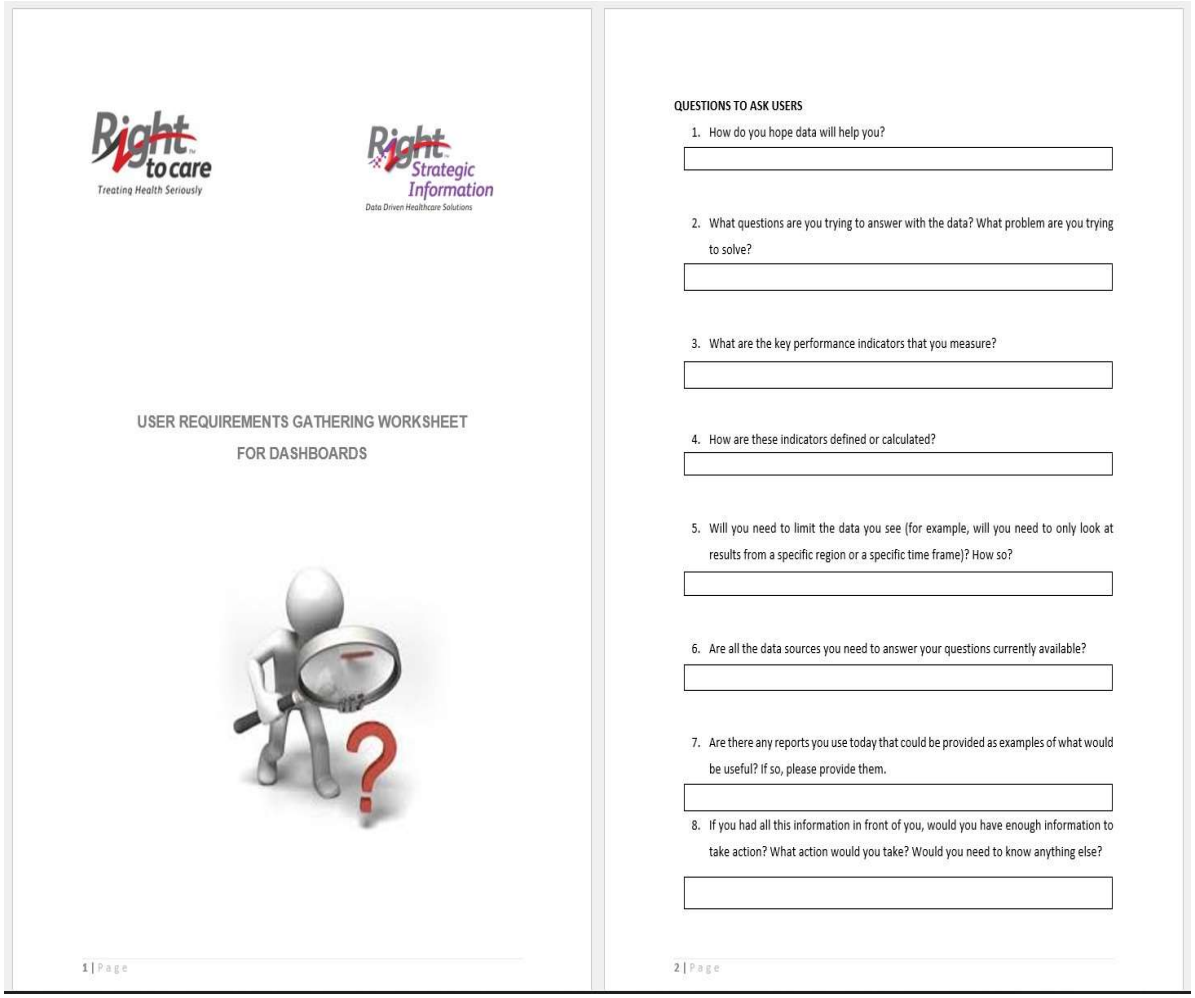


User Requirements Specifications (URS) Gathering

- What is required?
  - Database, visuals, extract, online system
- Building off the Business Model
  - Data dictionary
  - Domain Modelling
- Provide as much detail as possible
- Clarity at foundation of building is critical



Ask the right questions



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Data Driven Healthcare Solutions

USER REQUIREMENTS GATHERING WORKSHEET
FOR DASHBOARDS

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QUESTIONS TO ASK USERS

1. How do you hope data will help you?
2. What questions are you trying to answer with the data? What problem are you trying to solve?
3. What are the key performance indicators that you measure?
4. How are these indicators defined or calculated?
5. Will you need to limit the data you see (for example, will you need to only look at results from a specific region or a specific time frame)? How so?
6. Are all the data sources you need to answer your questions currently available?
7. Are there any reports you use today that could be provided as examples of what would be useful? If so, please provide them.
8. If you had all this information in front of you, would you have enough information to take action? What action would you take? Would you need to know anything else?

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✓ **Business requirements**

- WHO?: Target audience, business owner, technical owner
- WHAT?: problem dashboard aiming to address, Actions are the users trying to take based on this data

✓ **Technical requirements**

- WHO?: should have access to this data
- WHAT?: existing reports that should be replicated, required metrics/measurements
- WHERE?: Is the data already available, Data Base, Data source

Presentation 2- Handout 1- User Requirements Gathering Worksheet

Documenting Requirements Specification

REQUIREMENTS STATEMENT
FOR
DASHBOARD DEVELOPMENT

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DOCUMENT REVIEW AND APPROVAL

Action	Name and Surname	Designation	Signature and Date
Author		Business Analyst	
Approved by		Programme Manager	
Approved by		M&E Manager	
Approved by		Data Quality and Reporting Manager	
Approved by		Business Solutions and Innovations Manager	

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Document purpose

The purpose of this document is to capture the minimum business requirements for <program/project name> reporting.

2 OBJECTIVE (S)

The major objectives of this project are to:

3 SCOPE

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4 VISUALISATIONS

DESCRIPTION		EXAMPLE			
Report No.		Report Name		Report Type	
Publishing Platform		Priority		Data Source	

Example:

		FIELD	FORMAT	Sort
Row / Y-axis grouping	Group 1	NONE	Text	Asc

		FIELD	FORMAT	Sort
Column / X-axis grouping	Group 1	Modality Type	Text	Asc

Business rules:

Parameters	Required/ Optional	Format	Multi/ Single	Dependency	Sort
Province	Required	Text	Multiple	When selected only districts for that province should show	Asc
District	Optional	Text	Multiple	When selected only sub-districts for that District should show	Asc
From Date	Required	Date (Date Picker)	Single	NONE	NONE
To Date	Required	Date (Date Picker)	Single	NONE	NONE

	VALUES	CALCULATION	FORMAT
Values & Calculations	HTS_TST		Number
	HTS_TST Target		Number
	HTS_POS		Number
	TX_NEW		Number
	TX_NEW Target		Number
	Yield	HTS_POS / HTS_TST	Percentage
	Linkage	TX_NEW / HTS_POS	Percentage

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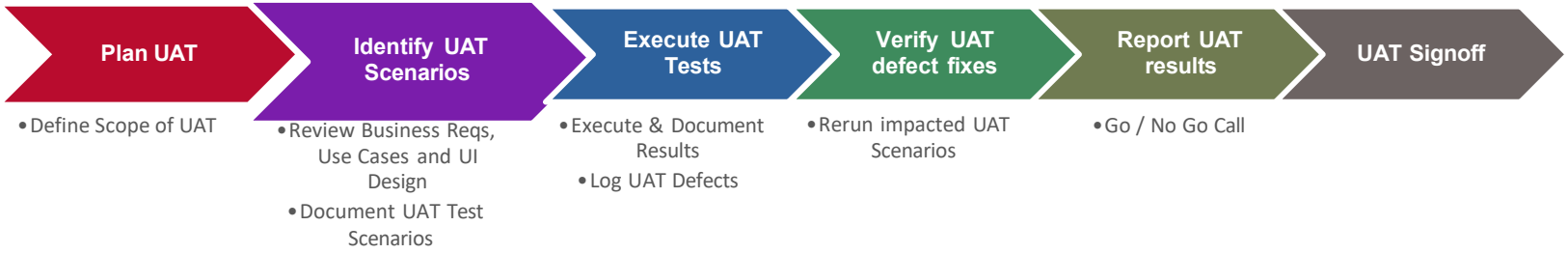
Presentation 2- Handout 2- Requirements Statement for Dashboards

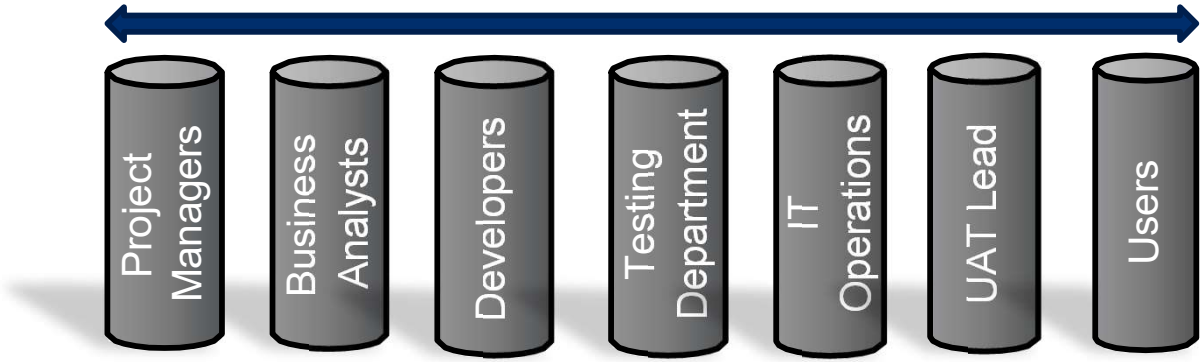
Testing of Tools (dashboards) after Development

User Acceptance Testing (UAT)

- WHAT? : A process of verifying that a user solution works for the user before it is signed out
- WHY? : To assess if the system can support day-to-day business and user operations as expected
- HOW? : UAT execution



- WHO? : UAT Team



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Question and answer session

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Choosing the right visuals/charts

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Why Data Visualisation?

All projects generate performance data. But not everyone knows how to ***read*** or ***use*** it.

When data is presented in a ***solely textual manner*** (Excel docs, CSVs), it can be ***difficult to interpret*** and ***not see the patterns*** that live within the data.

This is where the ***data visualisation*** comes to the rescue. Let's look at an example, before going into some of the most used graphs

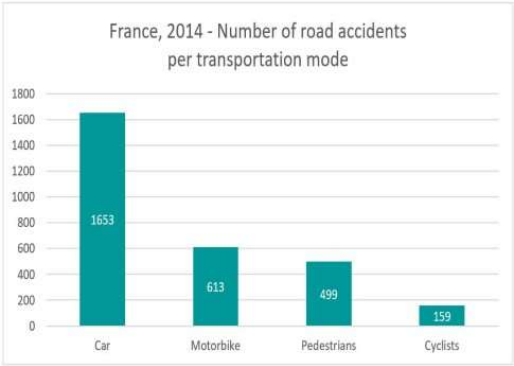
EXAMPLE OF DIFFERENT WAYS TO VISUALISE THE SAME DATA

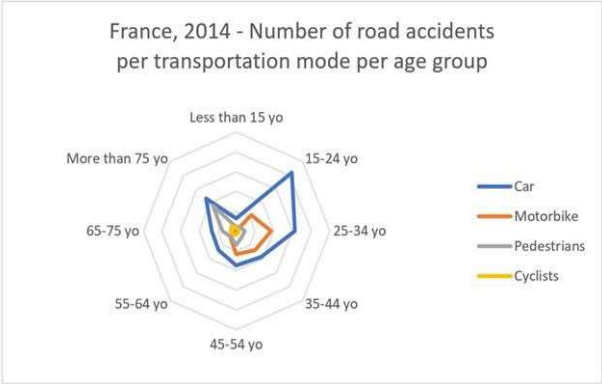
The table (i) below gives an easy and quick overview of the exact number of road accidents for pedestrians between 45 and 54 years old.

But how does this compare to cyclists or motor bikers? Simple column/bar graphs being able to highlight proportions, column graph (ii) clearly shows that car accidents are more numerous than other transportation modes

But a graph can do much more! This radar chart (C) highlights risk profiles: 15-24 and 25-34 years old are clearly at risk for car accidents, 25-34 years old for motorbiking accidents, and more than 75 year as pedestrians

France, 2014 - Number of road accidents per transportation mode	Car	Motorbike	Pedestrians	Cyclists	Total
Less than 15 yo	63	1	20	16	**100**
15-24 yo	419	114	28	11	**572**
25-34 yo	313	187	44	10	**554**
35-44 yo	186	139	42	12	**379**
45-54 yo	173	117	71	19	**380**
55-64 yo	136	48	41	22	**247**
65-75 yo	133	6	74	34	**247**
More than 75 yo	230	1	179	35	**445**
Total	**1653**	**613**	**499**	**159**	**2924**





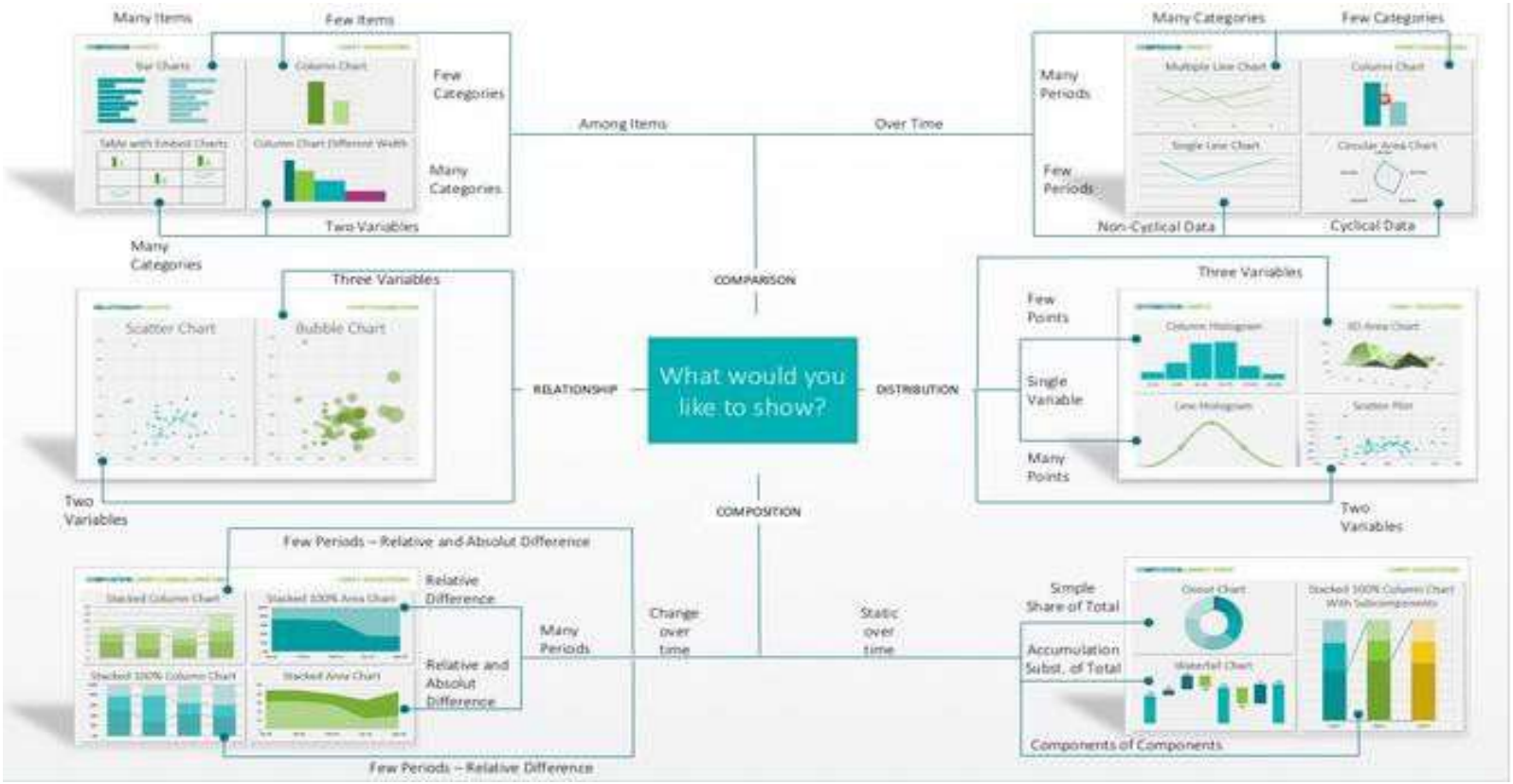
(From: Marie Kuter, UX Consultant, 'Home >blog >Data visualization: tables, graphs and augmented tables', Geneva, 2017)

Main Questions to Ask for Choosing the Right Chart

1) Who will be the **users** of the USAID project data for decision-making?
2) What **stories** behind the data do the users want the graphs to highlight?
3) How do the users want to show the project's achievements to date in the **most impactful manner**? For this:

- the users need to determine one or more of the four main **properties** of data presentation
    - how data is composed (**Composition**)
    - how variables relate to each other (**Relationship**)
    - how a variable behaves in comparison to others (**Comparison**)
    - how data is distributed across dimensions (**Distribution**)
- To choose the **right visualisations** for showing/reporting a project's performance against MER indicator targets, a "visualisation decision tree" can be a very helpful tool.

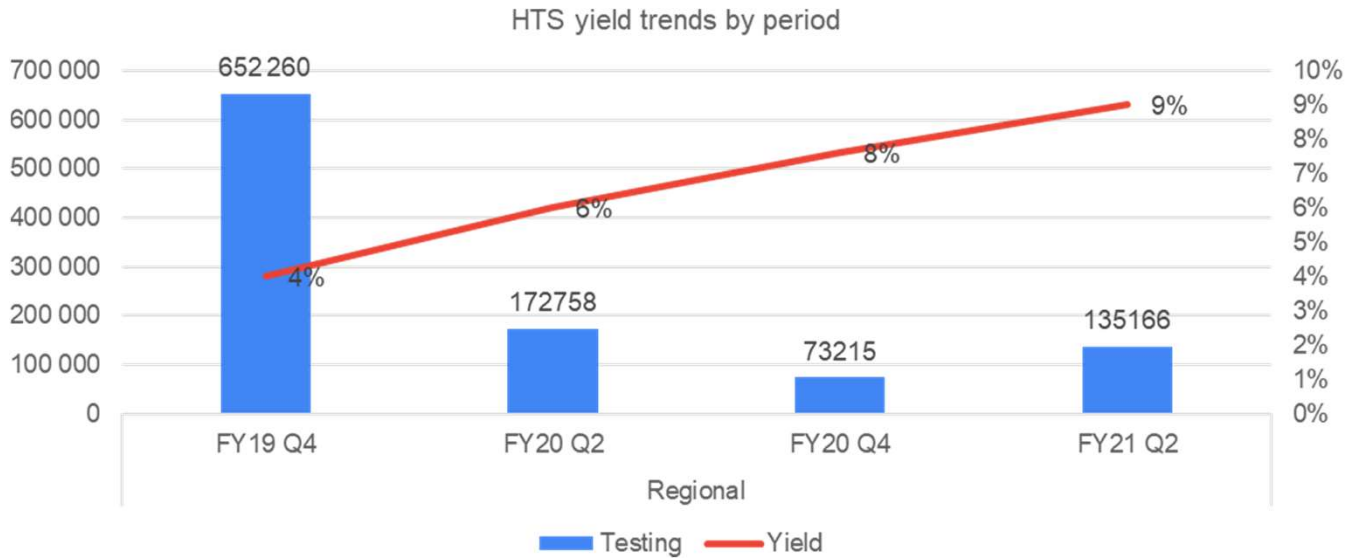
Chart Visualisation Decision Tree



Source: Andrew V. Abela, ExtremePresentation.com, 2009

Presentation 3- Handout 1- Chart Visualization Decision Tree

COMPARISON among few items:
Column Chart



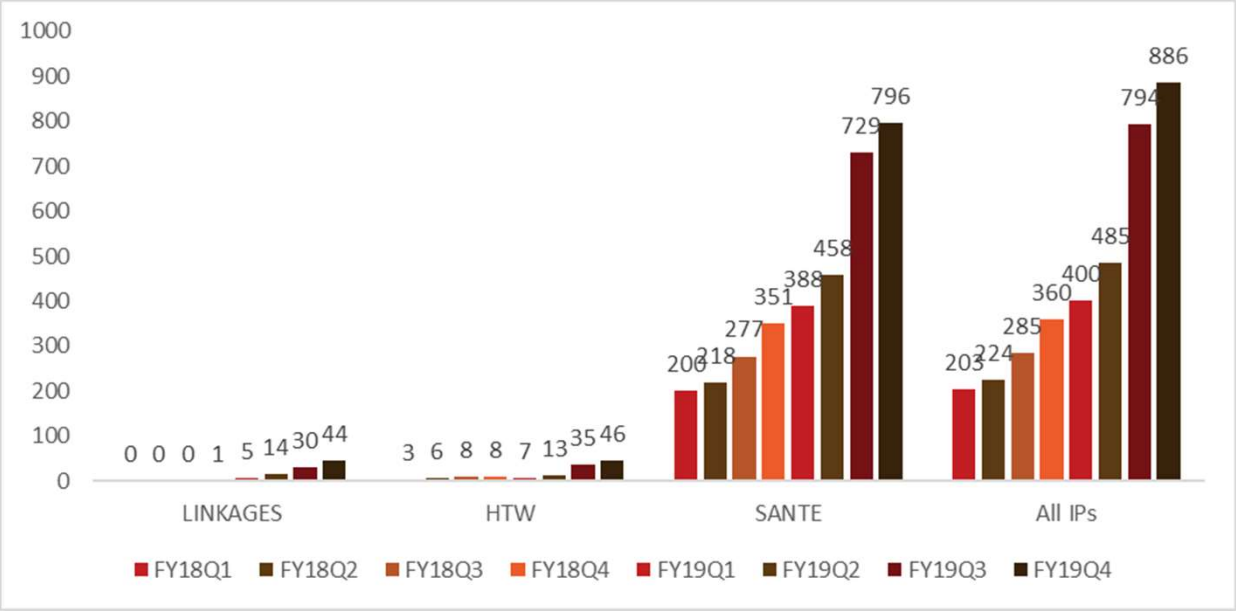
Column charts use vertical bars to show comparison between categories. They present categorical data with rectangular bars, with heights or lengths proportional to the values that they represent.
They are effective for showing the value at a point in time.

The bars can be plotted vertically (column chart) or horizontally (bar chart, especially useful with long descriptions).

Source: RTC/EQU P, Zambia, SAPR FY'21

COMPARISON among multiple items: Grouped Column/Bar Chart

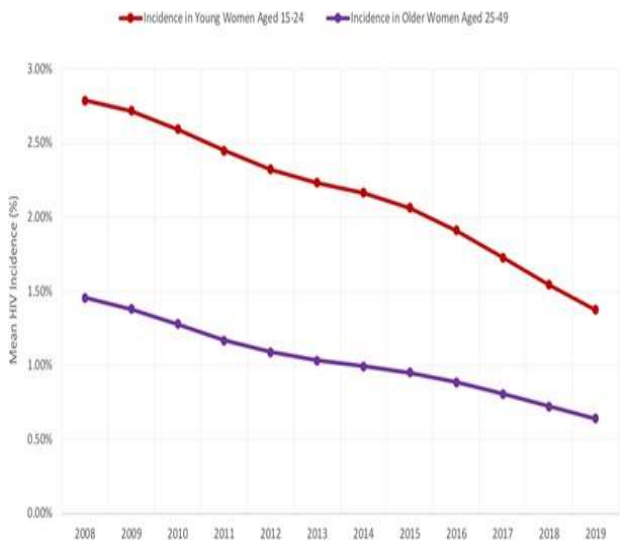
The Grouped Bar Chart (also called: Multi-set Bar Chart; Clustered Bar Chart) is used when two or more data sets are displayed side-by-side and grouped together under specific categories on the same axis.
Basically, it's the most simple bar chart with two or more graphs.



Graph: Number of patients on Second Line ARV Regimen per IP (Haiti)
Source: EQU P/Right to Care, Haiti, APR FY'19

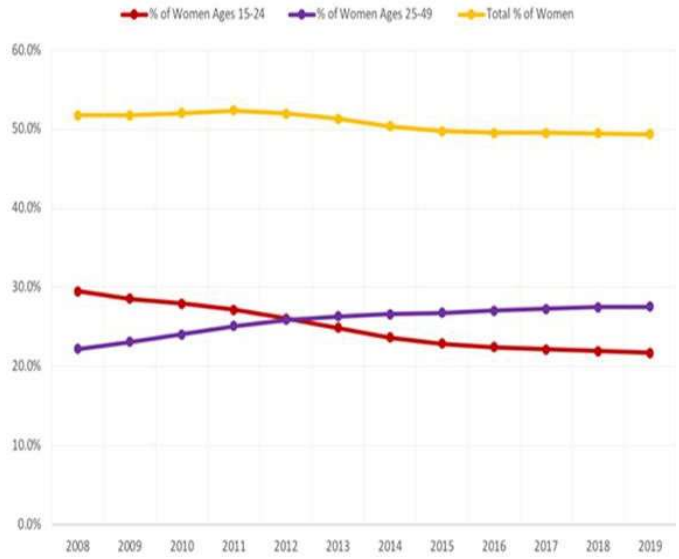
COMPARISON:
Over time

HIV Incidence in young women and girls (Aged 15 to 24) vs older women (Aged 25 to 49)



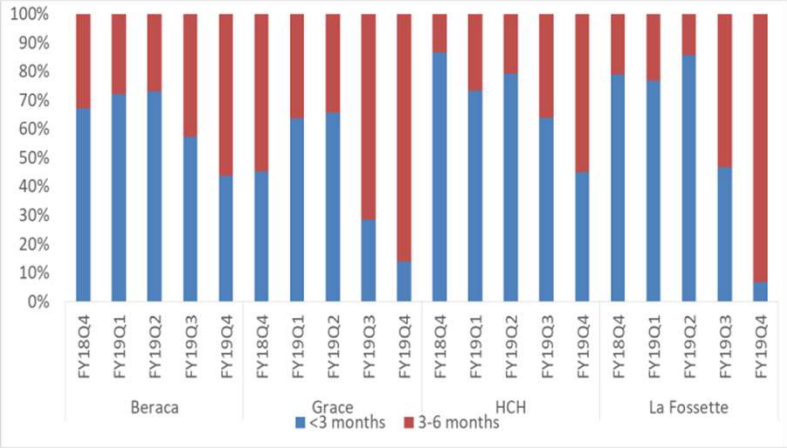
When you have a continuous data set, it's recommended that you use line charts . Best suited for trend-based visualizations of only a few categories over a period of time.

Percentage of condom use at last sexual encounter in young women and girls aged 15 to 24 and older women aged 25 to 49



Comparison:
Stacked Column Charts

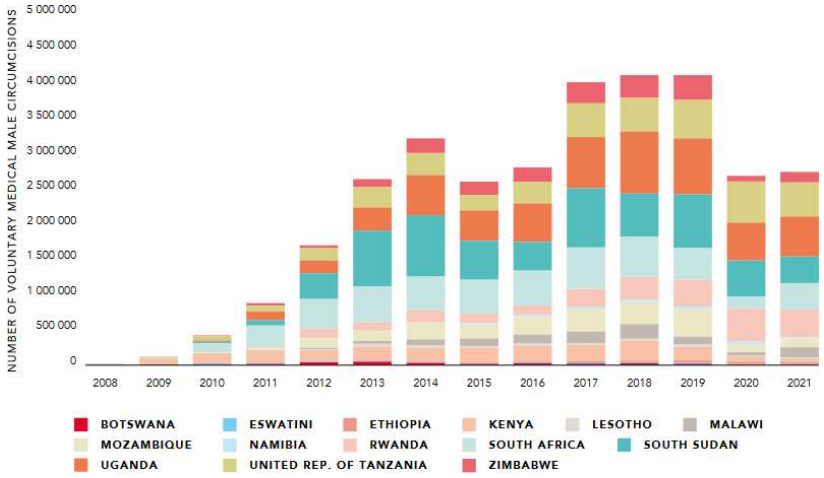
Stacked column charts use vertical bars, divided into sub- parts, showing the cumulative values of a data item and comparing the parts to the whole. Items stacked on top of one another are differentiated by colour.



Percentage of clients seen during a quarter who received 3-month ARV supply or more across the four regional sites, Haiti, 2019
(Source: iSanté (10-20-2019). EQUIP Right to Care

They are particularly useful when comparing relative and absolute differences — where the sum of the values is as important as the totals

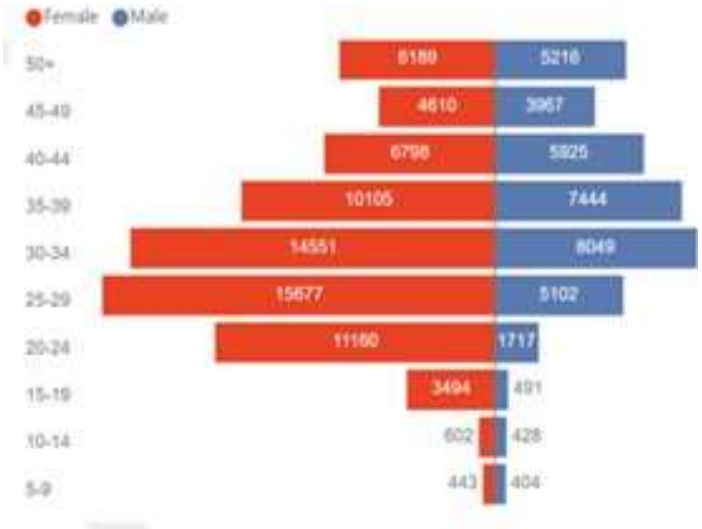
Percentage column charts are the same as stacked charts but show values as a percentage meaning that all the bars are the same length.
You can use them in the same way as stacked charts and they are particularly useful when comparing relative differences

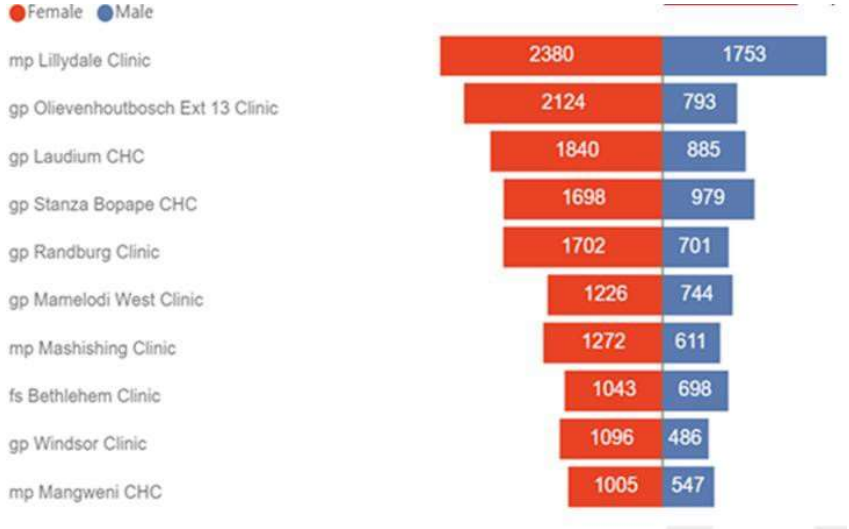


Annual number of voluntary medical male circumcisions, 15 priority countries, Eastern and Southern Africa, 2008–2021
(Source: UNAIDS Global AIDS Monitoring, 2022 (https://aidsinfo.unaids.org/)

COMPARISON:
Tornado chart

Tornado (or Divergent or Butterfly) Charts are essentially bar charts comparing two differing metrics at a time. Data categories are listed out vertically with the bars of differing metrics extending horizontally, on both ends of the listed categories.





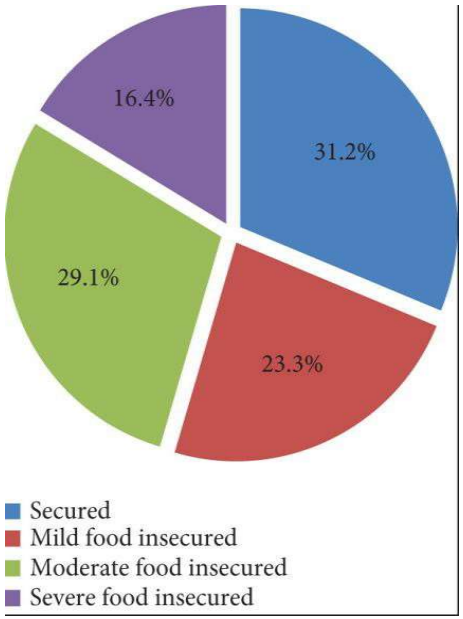
These charts come in handy while comparing two data sets or metrics which are contrasting in nature such as male-female, positive-negative, and the like

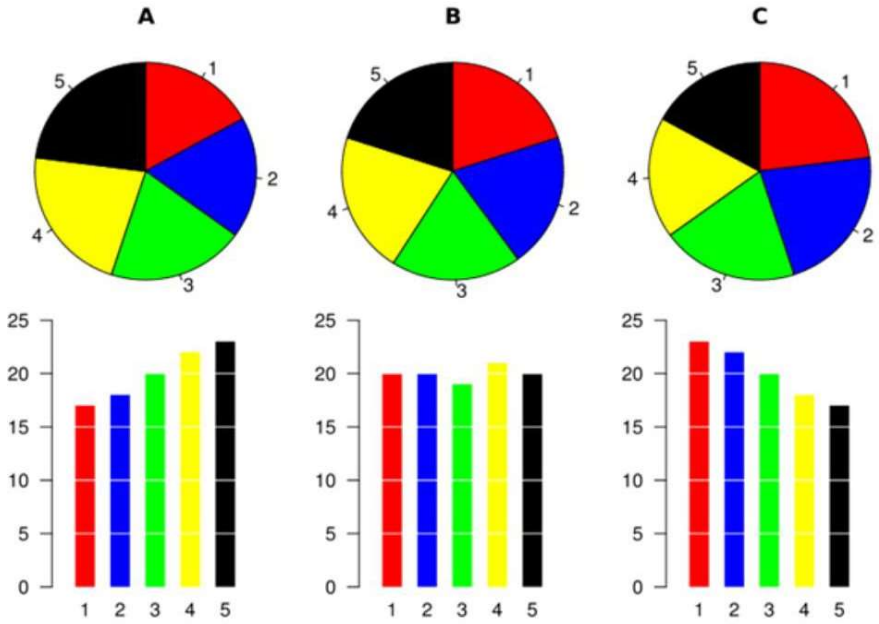
Source: Right to Care/QodeInside, 2020

COMPOSITION:
Pie Chart

A pie chart is used to visualize a part to whole relationship, typically representing numbers in percentages. Example:

Level of food insecurity among the respondents among people living with HIV/AIDS on follow-up at public hospitals of western Ethiopia





Source: Adugna Oluma, corresponding author Muktar Abadiga, Getu Mosisa, Werku Etafa, and Ginenus Fekadu, 2020. NHI, National Library of Medicine, Int. J Food Sci,

RELATIONSHIP:
Scatter chart and Bubble graph

Scatter plot charts are primarily used for correlation and distribution analysis, and facilitate showing the correlation (or not) between two different variables

A bubble chart allows one to add another dimension to a scatter chart. E.g., you can add bubble size as the third variable and thus enable comparison.

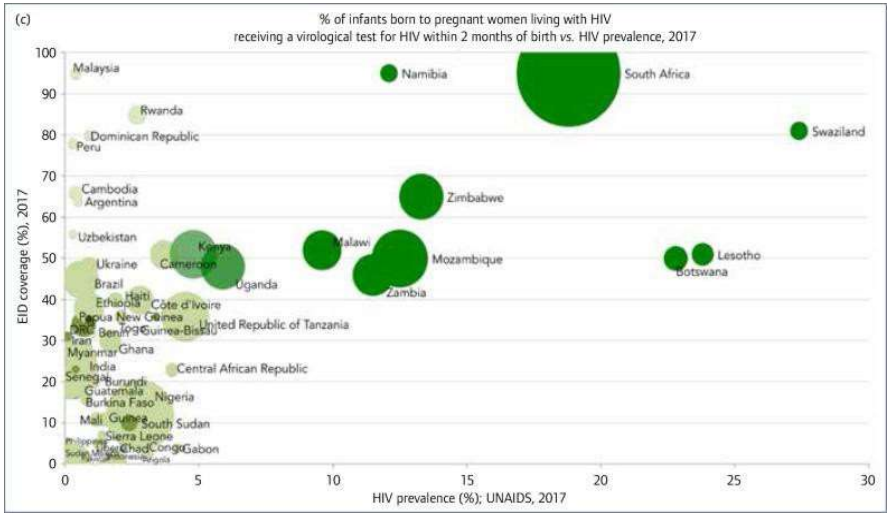
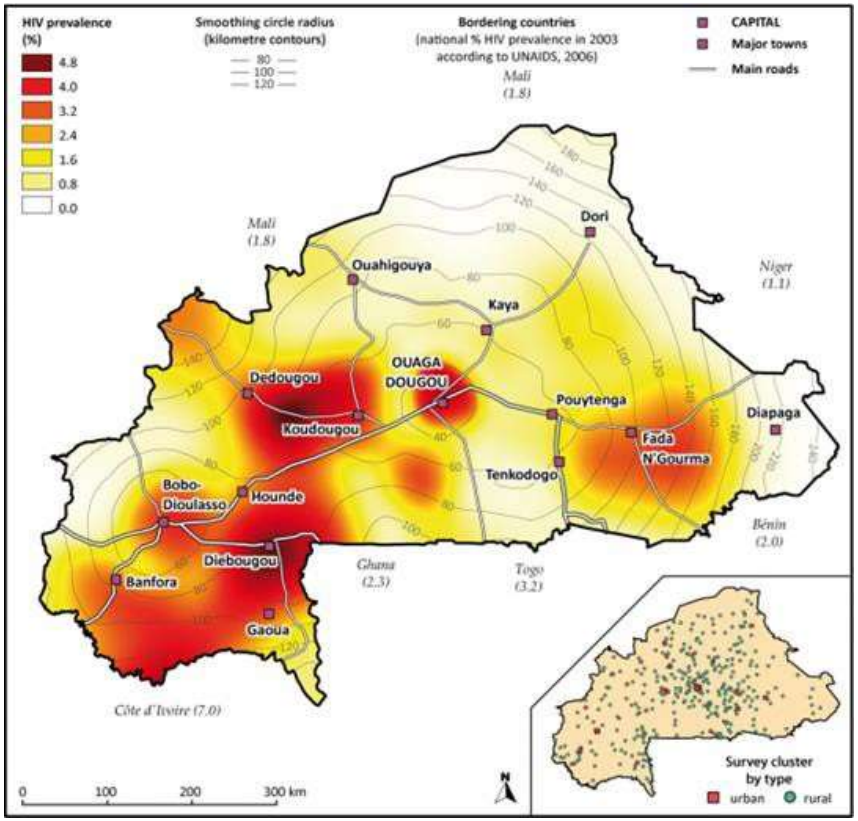


CHART TYPOLOGIES CONTEXTUALISED:
Map Charts

Map charts are great for giving numbers a geographical context to quickly spot best and worst performing areas, trends, and outliers.

Location data like coordinates, names of provinces, districts, or community spots allow for plotting related data on a map



Data Visualisations: Some Style Do's and Don'ts

Sorting: for column and bar charts, to enable easier comparison, sort your data in ascending or descending order by the value, not alphabetically.

Data-Ink Ratio: remove any excess information, lines, colours, and text from a chart that does not add value.

Labels: use labels directly on the line, column, bar, pie, etc., whenever possible, to avoid indirect look-up.

Colours: (a) in any chart, don't use more than six colours.

(b) for comparing the same value at different time periods, use the same colour in a different intensity (from light to dark).

(c) for different categories, use different colours. The most widely used colours are black, white, red, green, blue, and yellow.

(d) keep the same colour palette or style for all charts in the series, and same axes and labels for similar charts to make your charts consistent and easy to compare

LAST BUT NOT LEAST:

Data visualization is not a goal in its own right – instead, it is meant to facilitate data use to cultivate a results-focused decision-making environment

ASAP

ACCELERATING SUPPORT TO ADVANCED LOCAL PARTNERS

Question and answer session.

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FROM THE AMERICAN PEOPLE

Data for Decision-making: Part 2- Using dashboards effectively

Date: November 16, 2022

Right to Care: Strategic Information

ASAP
ACCELERATING SUPPORT TO ADVANCED LOCAL PARTNERS

Preparing and presenting operational and analytic dashboards

Andres Montaner
Monitoring and Evaluation
Right to Care (Group)
November 2022

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Data sources

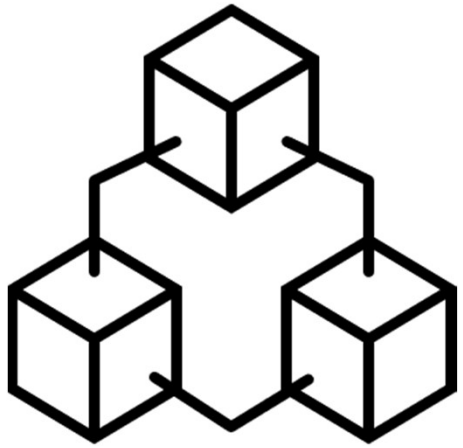
Excel

- Validations within a template
- Visualizations within a template

Direct Online Capturing through desktop or smart device/tablet

- Website for data input and direct import
- Automated Data Capturing
- DHIS2 (The District Health Information 2 Software)
  - Excel, Csv, XML, SQL
  - Visualizations within DHIS2 are possible

Data submission methods



Manual data processing

- Manual excel submissions

Network Database

- Secure File Transfer Protocol (SFTP)
- Email submissions Direct

Online Capturing

- Website for data input and direct import (Web forms, built in import procedures)
  - Ex: DAT M, DH S2…

Most data processing tools are a combination of these 3 depending on the available resources at data submission, review, and interaction levels (DATIM Integration System example)

Data verification methods

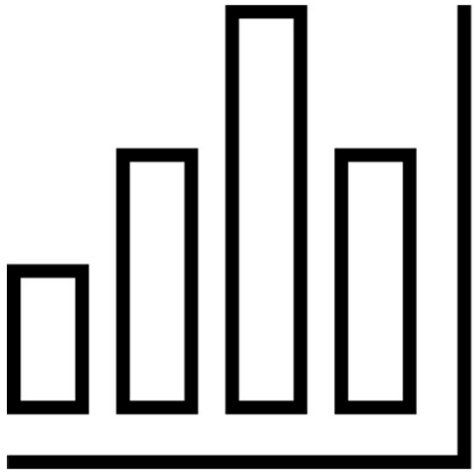
Verification Formulas

- Template verifications (Demo 1) (*Presentation 4- Demo 1- Excel Validations*)
- Live capturing verifications
  - Data integrity Checks and Data Queries (also built within DHIS2)

Hierarchy Approvals

- Manager review, for example, Right to Care DATIM Integration System (Demo 2)
- Data access rights and user authorisation (also built within DHIS2)

Data visualization software



Growing field of Data Analysis

- Looker, DOMO, Tableau, PowerBI, Databox

Assess organization software and program requirements

- Reporting vs Internal Reviews
- Visualization Demos
  - Excel Pivots (*Presentation 4- Demo 2- Excel Validations*)
  - Power BI (*Presentation 4- Demo 3- Excel Validations*)

  Validations Demo (*Presentation 4- Demo 1- Excel Validations*)
- DATIM Integration System Exercise (Built on DHIS2 technologies)

Program Action Plan: Situation Room Review

Project Focus	Intervention	Target	Achievement	Challenge	Root Cause & Related Intervention	Responsible Parties
Malnutrition	Distribute NACs	40 at X site per week	15 distributed at previous week	Shortfall of 25	? ?	District leads, site staff, supply chain, technical leads, SI staff
Persons unaware of their HIV+ status	Targeted HIV testing	Test 80 at site x per week	120 tests completed at previous week	?	? ?	Testing Co-Ordinator, site leads, site staff, SI staff
Gender Based Violence	Counselling enrolment, PEP distribution	All screened for violence enrolled in counselling	70% enrolment over previous week	Gap of 30%	? ?	?

Data visualization- Demonstration Slides

Excel Validations

- Review validations tab in example template
  - Provide logic checks at data entry level
  - Data entry staff able to view "rule" in question and data location in template to check data
- New Sheet or table for validation formulas
  - Ex: A1 = B1, A1 > B1, A1 = (B1+C1),
    (A1 + C1) <= (B1 + D1)…
    - True or False will be displayed

L11 | =Testing!CW20>=(Testing!CX20+Testing!CY20)

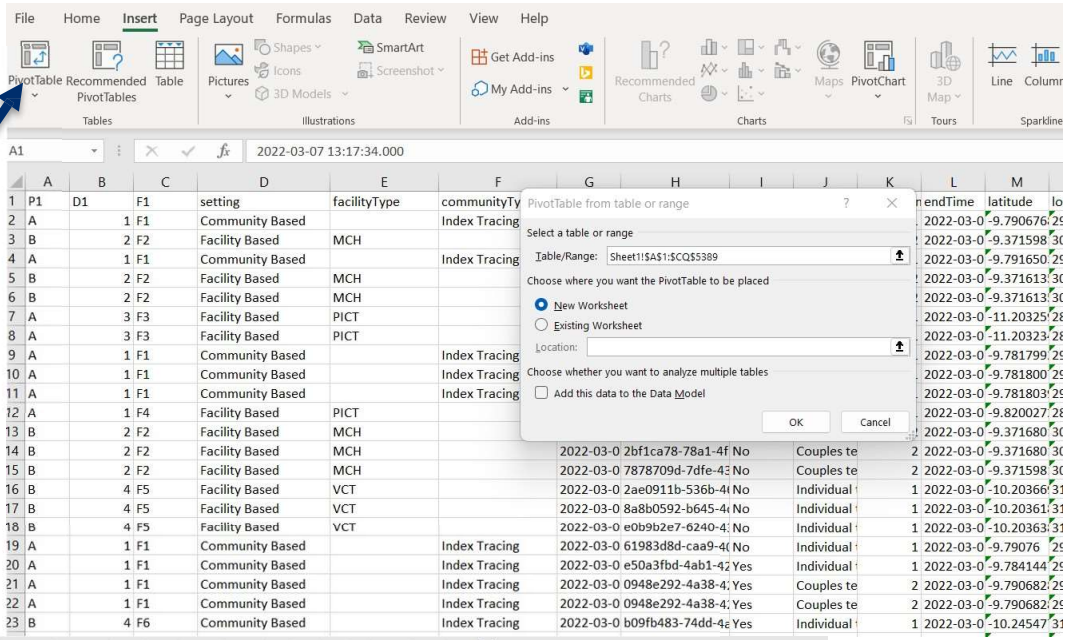
	A	K	L	M	N
1					
2	Data Validation Rule	**HTS_TST >= HTS_POS**	**HTS INDEX :** the number of contacts who were tested for HIV should be less or equal the number of contacts provided	**HTS_TST_INDEX <= HTS_TST + HTS_TST_INDEX**	**HTS_INDEX_POS <= HTS_TST_POS + HTS_INDEX_POS**
3	ROW	Status	Status	Status	Status
4	All 0=<2Months (<2 Months)	TRUE	TRUE	TRUE	TRUE
5	All 2-12 Months	TRUE	TRUE	TRUE	TRUE
6	F 0=<2Months (<2 Months)	TRUE	TRUE	TRUE	TRUE
7	F 2-12 Months	TRUE	TRUE	TRUE	TRUE
8	F <1	TRUE	TRUE	TRUE	TRUE
9	F 1-4	TRUE	TRUE	TRUE	TRUE
10	F 5-9	TRUE	TRUE	TRUE	TRUE
11	F 10-14	TRUE	TRUE	TRUE	TRUE
12	F 15-19	TRUE	TRUE	TRUE	TRUE
13	F 20-24	TRUE	TRUE	TRUE	TRUE
14	F 25-29	TRUE	TRUE	TRUE	TRUE
15	F 30-34	TRUE	TRUE	TRUE	TRUE
16	F 35-39	TRUE	TRUE	TRUE	TRUE
17	F 40-44	TRUE	TRUE	TRUE	TRUE
18	F 45-49	FALSE	TRUE	TRUE	TRUE
19	F 50+	TRUE	TRUE	TRUE	TRUE
20	F 50-54	TRUE	TRUE	TRUE	TRUE
21	F 55-59	TRUE	TRUE	TRUE	TRUE
22	F 60-64	TRUE	TRUE	TRUE	TRUE

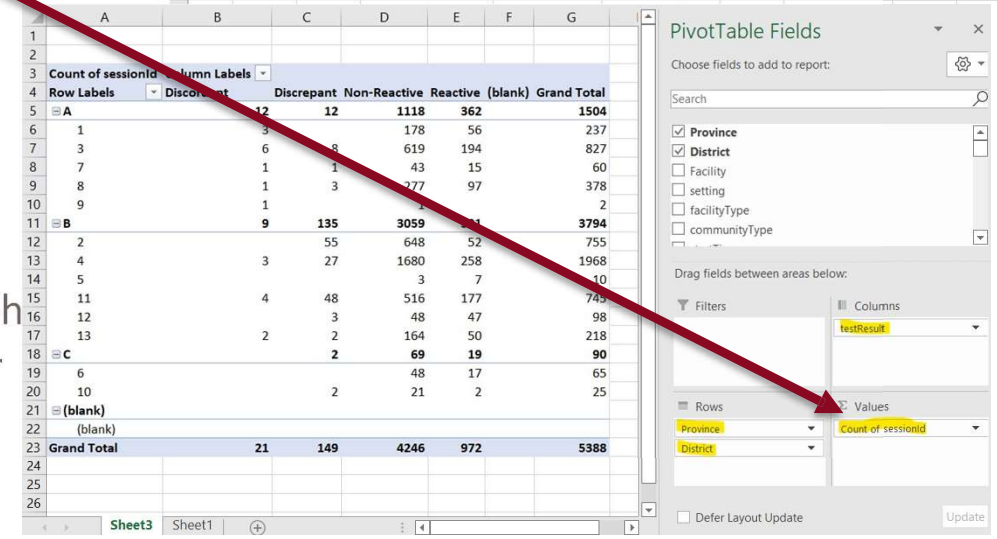
DATIM Integration System Example

- Submitting Templates on SFTP
  - Excel template submitted to Network database
- Log into online data management system
  - View roles
- Review submitted data
  - Facility, district, provincial, national
- Approve or reject data
  - Confirm or reject data validations and accuracy
- Reporting formats
  - Filter & Extract

Excel Visual

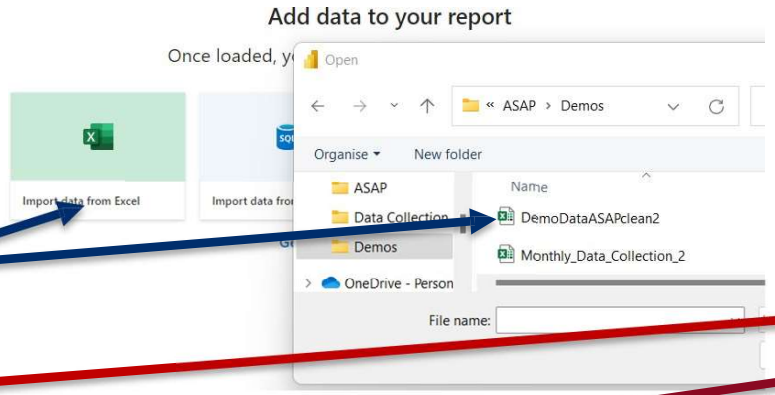
- Review Indicators
  - What can be investigated
- Pivot Table
  - Highlight all data -> Insert Pivot on next sheet
  - Select unique id
  - Trouble shoot tables
    - Rows and columns
- Graphs
  - Insert -> Pivot Chart
    - Trouble shoot graph types and indicator display options

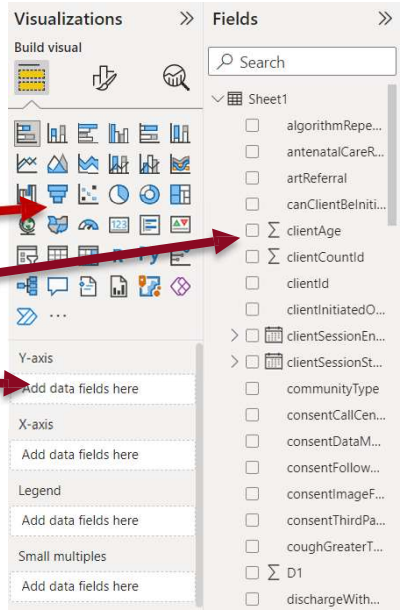


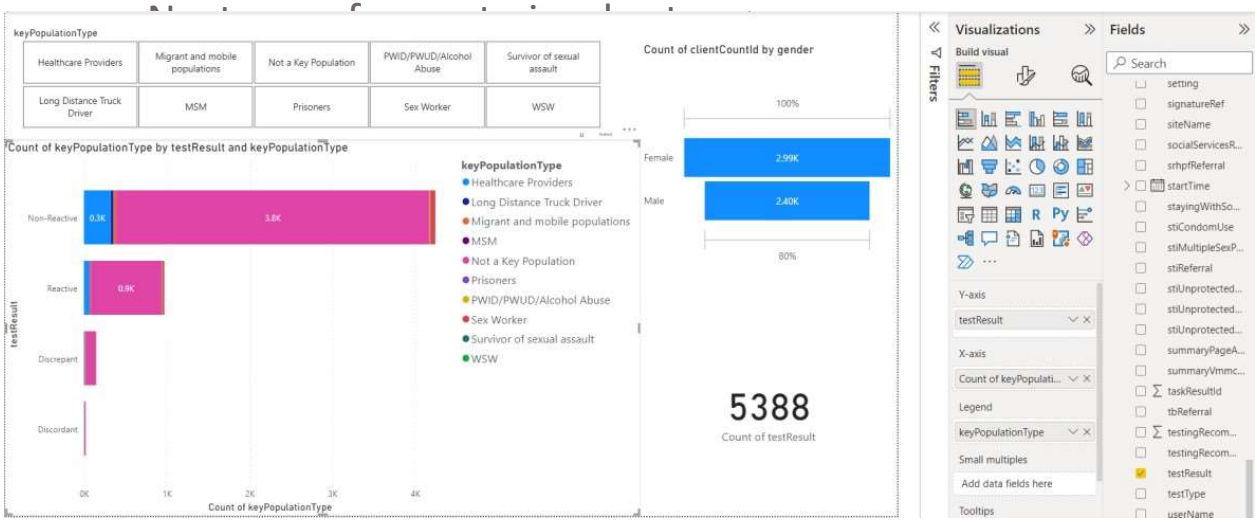


PowerBI Visual

- Selecting Data Source
  - Confirm data lay out
- Select Desired Visual
  - Input indicators into X and Y axis
  - NOTE: Filters applied on page will affect all visuals on page







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Advanced *Data analytics*

Dr. Silviu Tomescu
Analytics
Right to Care (Group)
November 2022

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ACCELERATING SUPPORT TO ADVANCED LOCAL PARTNERS

Why the need for Data Analytics: Value add to programs

- PEPFAR "ensures that every dollar is optimally focused for impact through data-driven policies"
- Data Analytics is not a nice to have, it is a need for more effective budget allocation, planning and programming

Data Analytics

Generate insight using basic and advanced analytics

- **Basic (Dashboard Analytics)**
  - Monitor state of program performance
  - Trend/pattern identification
  - Used to identify areas where performance is good or can be improved
  - Good at answering program planning questions
    - What is affected? where? and to some extent why?
- **Advanced (Deep Dive Analytics)**
  - Identify causal factors and contribution (e.g. to IIT, VL non-suppression, HIV positivity)
  - Useful when there are many factors/explanatory variables available to analyse:
    - E.g. age, sex, location, distance from facility, employment, education level, side effects, co-morbidities, mental disorders, average number of days late, number of times late/IIT, cohabiting/marital status, religion, transport
  - Good at explaining why something may be happening.
    - The why can then be translated into action

Basic analytics to power automated reporting vs. MER indicators

- All programs are judged/scored based on achieving a particular set of indicators – MER Guideline
  - Two levels of MER:
    - 1: Non-composite
      - HTS_TST, HTS_TST_POS, TX_NEW, TX_CURR
    - 2: Composite: Needs calculation
      - Yield = HTS_TST_POS/HTS_TST * 100
      - Linkage = TX_NEW/HTS_TST_POS * 100
      - TX_PVLS = # Suppressed ART patients / # Patients with a VL result documented within last 12 months * 100

- Required vs not required daily/weekly/monthly
  - Indicators not required give insights into program gaps
    - E.g. TX_PVLS is required. Gaps in the underlining indicator, how many tests done to get suppression (the denominator)

- Basic analytics and high frequency reporting (HFR)
  - Daily situation rooms – forum to discuss daily/weekly with different stakeholders
  - Creates better communication
  - Alarm IPs on the problem – highlights first level of danger around performance (e.g. 7% Yield last week vs 3% Yield this week).
  - Can be automated by one person
    - Reduce error
    - Reduce staffing
    - Static or interactive reports

Advanced / Deep Dive analytics (Why?)

- Capacitation
  - Especially on interpretation of analyses
  - Get insights into a key problem
    - We want to learn more about why is a problem occurring – to plan cost effective intervention

- What are the needs to perform deep dive
  - Patient level data
  - Bigger dataset – affects insights
    - more observations i.e., patient records and
    - more explanatory variables e.g.(Demographics, location, education, etc)
  - Skilled people – to do statistical analytics, descriptive and predictive analytics, principal component analysis, dimensionality reduction

- Data for action frameworks (what is the action to be taken)
  - Capacitation - leverage analytics into action for impacting programs
    - Tailored targeted intervention to address the problems
    - Impact evaluation – short term and long-term impact
    - Standardise effective interventions across all programs

Examples

General intervention

- Wanted to know if 6 months MMD could improve patient adherence

Multimonth dispensing of up to 6 months of antiretroviral therapy in Malawi and Zambia (INTERVAL): a cluster-randomised, non-blinded, non-inferiority trial

- Influenced expansion of 6 months MMD in Malawi and Zambia

Hof f man, R. M., Moy o, C., Balakasi, K. T., Siwale, Z., Hubbard, J., Bardon, A., ... & Rosen, S. (2021). Multimonth dispensing of up to 6 months of antiretrov iral therapy in Malawi and Zambia (INTERVAL): a cluster-randomised, non-blinded, non-inf eriority trial. *The Lancet Global Health*, *9*(5), e628-e638.

Targeted intervention

- APACE program wanted to predict those that would miss appointment or be virally non-suppressed

Applying machine learning and predictive modeling to retention and viral suppression in South African HIV treatment cohorts

- Predictive models to anticipate patients that would become IIT or virally non-suppressed
- Paved way for pre-emptive HIV programming

Maskew, M., Sharpey -Schaf er, K., De Voux, L., Crompton, T., Bor, J., Rennick, M., ... & Pisa, P. (2022). Apply ing machine learning and predictiv e modeling to retention and v iral suppression in South Af rican HIV treatment cohorts. *Scientific reports*, *12*(1), 1-10.

- Cost effective ways of running a program
- More insight leads to more action and better patient outcomes
- Targeted programming and intervention
- Creates accountability for money spend
- Evaluate impact of intervention
- Up and down scaling
- Is it worth to continue a program?

Case study:

- Problem?
  - Chief of party flags IIT

- How do we approach this challenge?
  - Conduct descriptive analysis to investigate the occurrence of IIT
  - Set up a dashboard
  - Identifying groups that are most likely to IIT for pre-emptive intervention (e.g., counselling before IIT happens)

Dashboard Analytics

Power BI

Off the shelf and free to use

- Distribution of IIT
- Prioritisation of effort (Pareto principle)
  - Assumes that "vital few"(~ 20%) causes account for 80% of an outcome (e.g. 20% of facilities account for 80% of IIT)
  - Useful in guiding targeted intervention to optimise best use of resources
  - Target groups (facilities, demographic groups, etc)

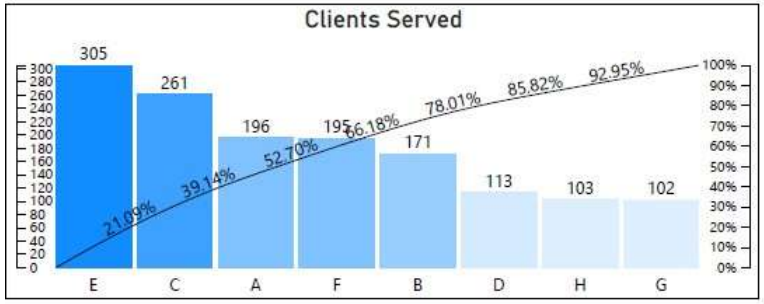
- Strategic considerations can be formulated based on the observations
  - Identification of sociodemographic groups to target for intervention
    - Targeting strategies
  - Program implementation

Priority facilities

Resources are sometimes limited. While we can guide all facilities to follow up better on some particular clients (age groups, gender, etc), it may be necessary to prioritise certain facilities to maximise impact while minimising effort. Pareto's 80:20 rule (guideline).

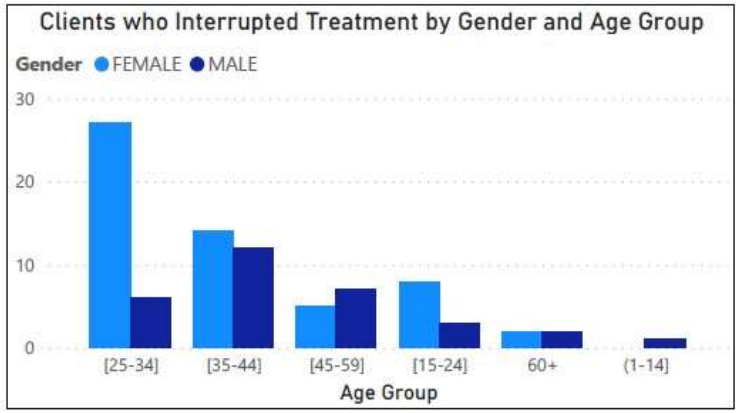
Facility: All

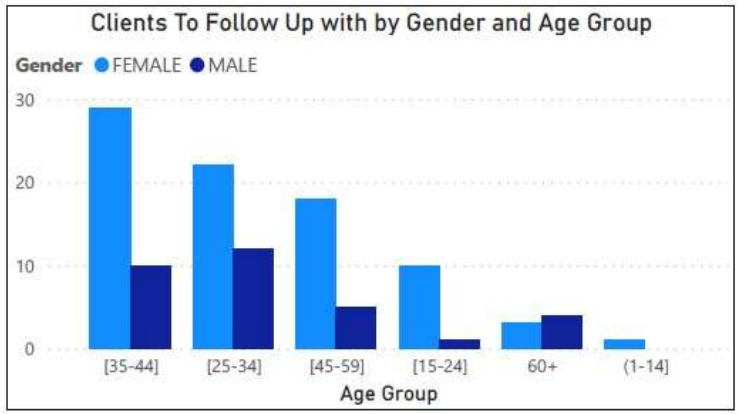
Gender: All



- Knowing which facilities have the most clients may guide deployment of limited resources
- Knowing which facilities have the largest number of **clients**:
  - **IIT (facilities C and E)**
    - Can identify facilities where enhanced adherence counselling (EAC) may be needed
  - **To follow up with (facilities E and C)**
    - Can identify which facilities could use a call centre or a client-reminder SMS platform
- **Does this explain what are the characteristics (age, sex, years on treatment, etc.) of clients that are associated with IIT?**
  - No. You may have some idea but it should be investigated
    - That is – conduct descriptive data analytics to understand why or what may contribute to, for example, high IIT/TFO
- Let's add some more variables!

Target groups and strategic considerations





- Let's look at a few more variables
  - Age group and sex
  - Now we can see that most IIT/TFO clients are females aged 25-44

- But now we lost facility name and the number of years on treatment
  - We can recall that facilities C and E did have the highest number of IIT/TFO
  - And that IIT/TFO occurs most in clients under 1 year of treatment

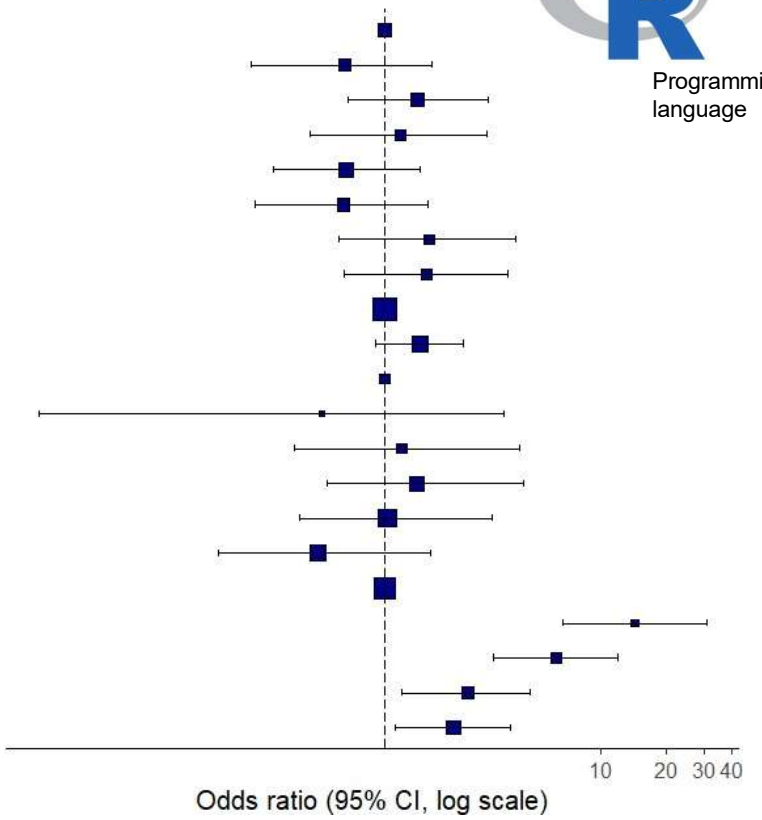
- What happens if someone is aged 45-59?
  - Can they not be at risk of IIT at all?
  - If we only have 4 explanatory variables (sex, age, facility and years on treatment), then we can look at one of the remaining 3.

Data Analytics Findings - Factors associated with IIT

Can accommodate a virtually infinite number of explanatory variables and observations (number of patients) granted sufficient computational resources

Programming language

Outcome: OR (95% CI, p-value)		
Facility	A	-
	B	0.65 (0.24-1.65, p=0.379)
	C	1.42 (0.68-3.03, p=0.357)
	D	1.19 (0.45-2.97, p=0.721)
	E	0.66 (0.31-1.45, p=0.297)
	F	0.64 (0.25-1.58, p=0.343)
	G	1.60 (0.61-4.03, p=0.320)
	H	1.57 (0.65-3.72, p=0.310)
Gender	FEMALE	-
	MALE	1.46 (0.90-2.32, p=0.118)
AgeGroup	60+	-
	[1-15)	0.51 (0.03-3.53, p=0.555)
	[15-25)	1.20 (0.38-4.17, p=0.760)
	[25-35)	1.41 (0.54-4.39, p=0.514)
	[35-45)	1.03 (0.41-3.15, p=0.958)
	[45-60)	0.49 (0.17-1.62, p=0.206)
YearsOnTreatment	5+	-
	[0-1)	14.35 (6.67-30.67, p<0.001)
	[1-2)	6.21 (3.19-11.97, p<0.001)
	[2-3)	2.41 (1.20-4.70, p=0.011)
	[3-5)	2.07 (1.11-3.81, p=0.020)



Odds ratios make a model practically useful without intensive IT infrastructure. In most cases, the counsellors are the limitation, not the lack of clients we can send for EAC. Therefore, why invest in the effort to detect all of them when we can easily focus on clients very likely to IIT

Turning findings into action

Let's say our solution to IIT is EAC.

Score	0	1	2	3
Gender	Female	Male		
Age Group	1-15, 35-45, 45+	15-35		
Years on Treatment	5+	2+	1-2	0-1

Aggregated Score (IIT Risk)		
0-2	3-4	5

- You can only counsel one person, who would it be?
- A: Female , 45+, 1-2 years on treatment?
- B: Female, 15-35, 0-1 years on treatment?
- C: Male , 15-35, 0-1 years on treatment
- What if you can counsel 2 persons?

DISCUSSION AND PROBING

Who has faced a recurring problem with in your program?
-an example for the deep dive analytics process

ASAP

ACCELERATING SUPPORT TO ADVANCED LOCAL PARTNERS

Question and answer session.

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Geospatial techniques and analytics

Dr. Dorman Chimhamhiwa
GIS and Planning
Right to Care (Group)
November 2022

ASAP
ACCELERATING SUPPORT TO ADVANCED LOCAL PARTNERS

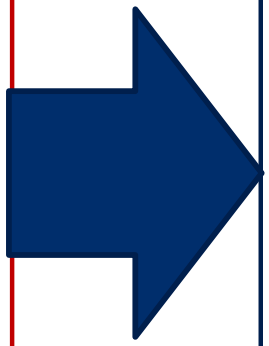
Outline

1. Data elements for defining geolocation
2. GIS data collection tools
3. Integrating locational and non-locational data in the GIS environment
4. Geo analytics and visualization in support of enhanced programme implementation – some examples
5. Quick GIS practical

Decide how geolocational information will be defined

Examples of **Programme support Areas (Health related)**

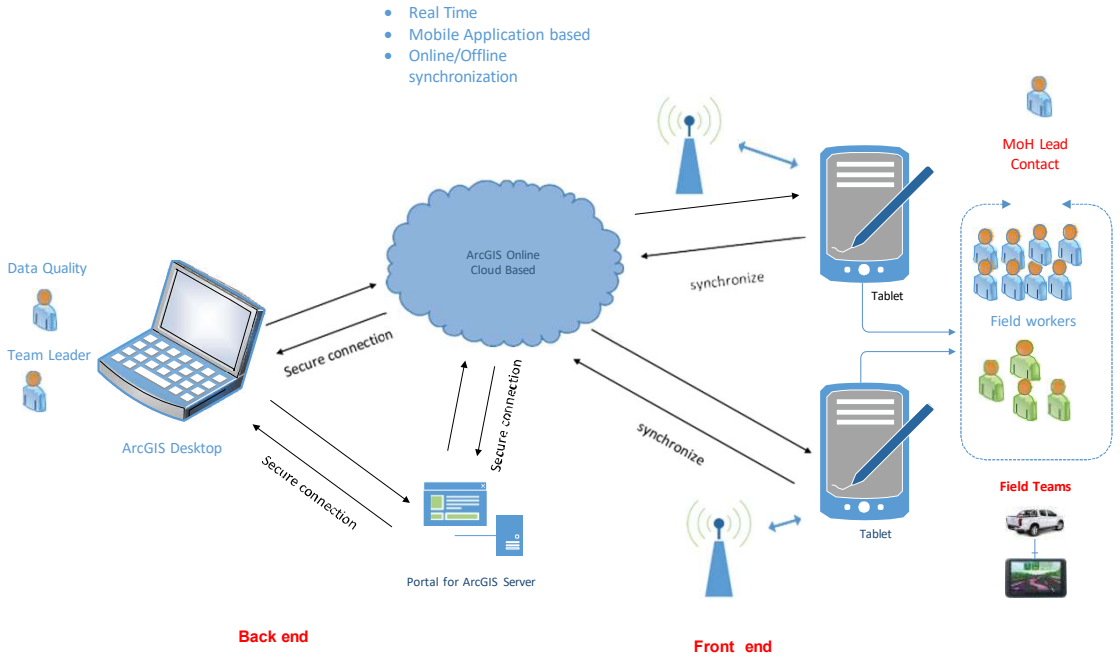
- HIV
- TB
- Vaccination
- Health Systems Strengthening
- Voluntary Medical Male Circumcision
- Adolescent Girls and Young women



geo location data defined in different ways:

- Coordinates
- Addresses
  - Street, suburb, settlement/town
  - Village, settlements,
  - Community
- Health facility providing care
- Laboratory
- Other health access points e.g., pick up points, adherence club locations
- Defined landmarks
- Service routes
- Other mechanism of defining location

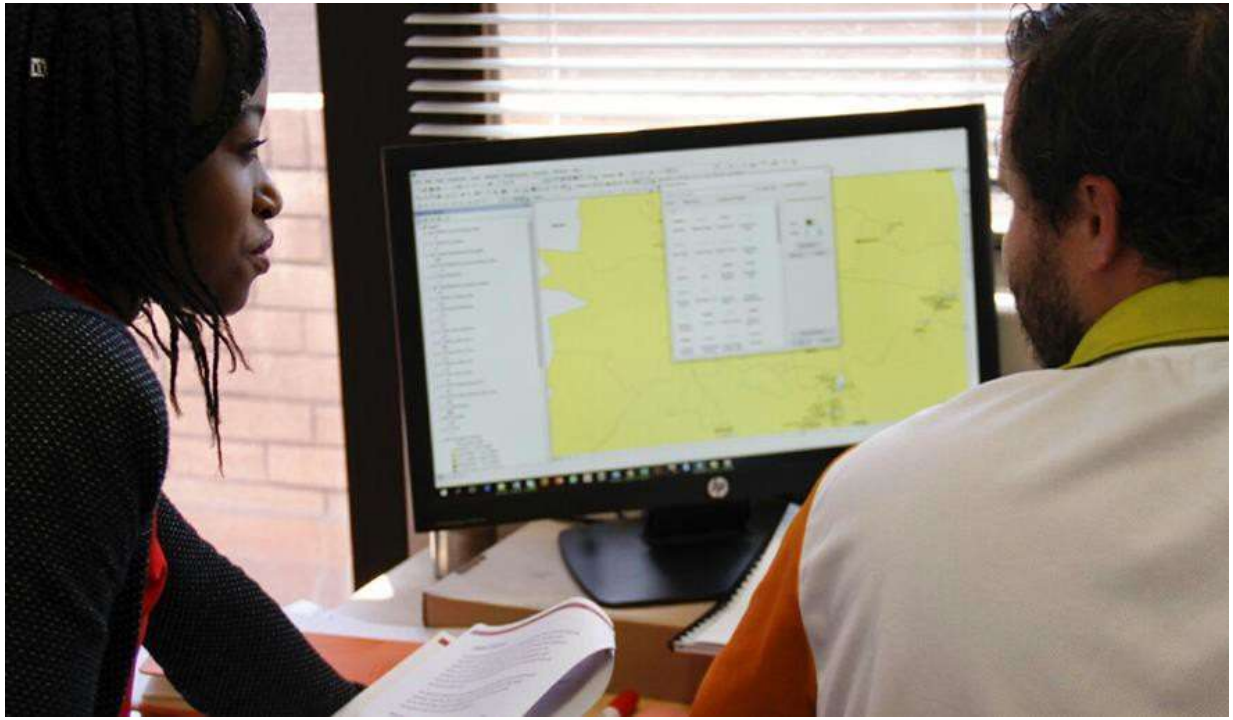
Set up efficient GIS data collection systems



- Systems can be built from simple to complex, depending on needs and resources

GIS teams collect different data elements such as:

- GPS Coordinates of health facilities, points of interest
- Specimen pick up points.
- infrastructure and communication services availability at each facility
- Other critical data

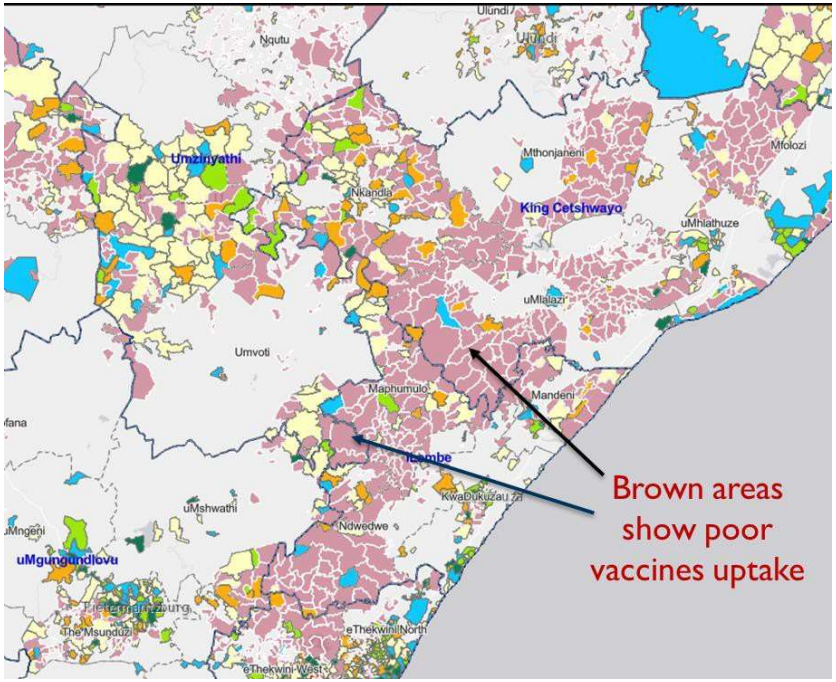


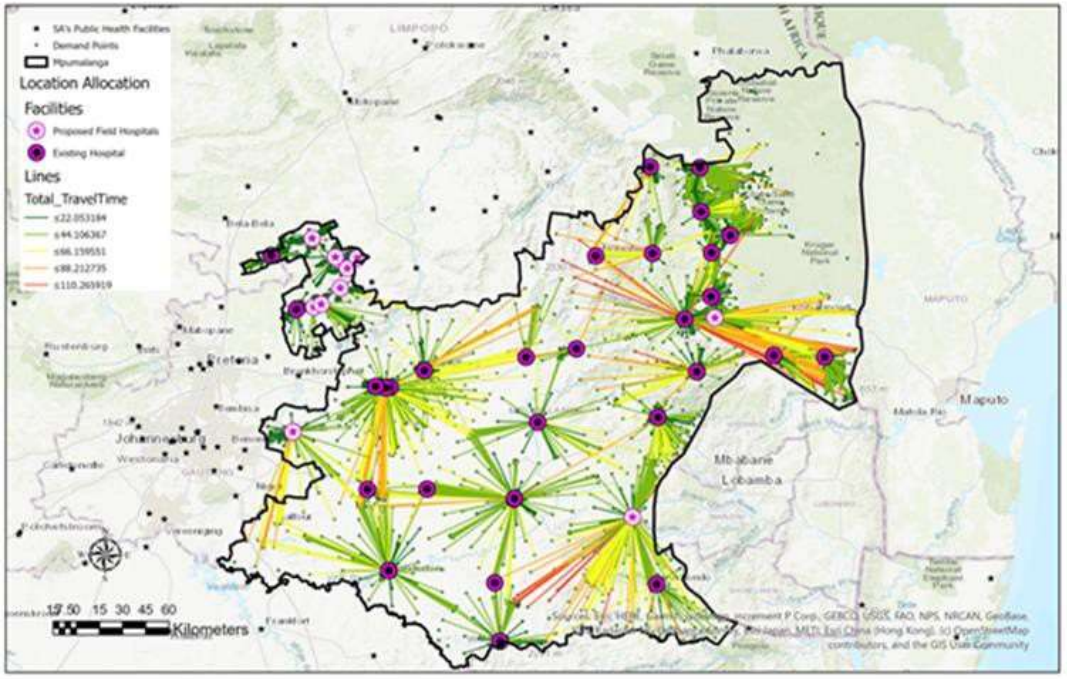
Some key Steps

- Data structuring, formatting, cleaning
- Pulling nonclinical data into GIS
- Integrating clinical data into GIS
- Conducting simple spatial analytics
- Conducting complex/advanced spatial analytics

Key programme and non programme data is geo-mapped in appropriate GIS software

Data analytics and visualization in GIS guides targeted implementation





- GIS showing visual presentation of programming gaps and areas to focus on
- Leads to improved targeting on interventions

Example 1:
Supporting HIV Programming using GIS

1. First 95 : Testing	2. Second 95 : Treatment	3. Third 95 : Suppression
Geo spatial mapping of: • where we should be testing in the community • where hotspots are • where the target population Is highly concentrated • Facility and community level driven participatory mapping of disease burden and risk profiling • Integrated analyses using multiple datasets	• Mapping spatial patterns of ART uptake to identify areas with greatest gap in care • Monitoring spatial patterns of ART coverage over time • Supporting community tracking of LTFUs through track and trace tools	• Visualize spatial distribution of retention and viral suppression to identify areas with poor retention and suppression that require targeted interventions • Identify areas with high rates of viral suppression, where patients can be treated in the community • Visualizing facility level viral suppression and access • Planning for viral load scaling up (Strengthening specimen transportation and resource optimization) • **where should we place what resources** - e.g. pickup points, viral load analyzers etc

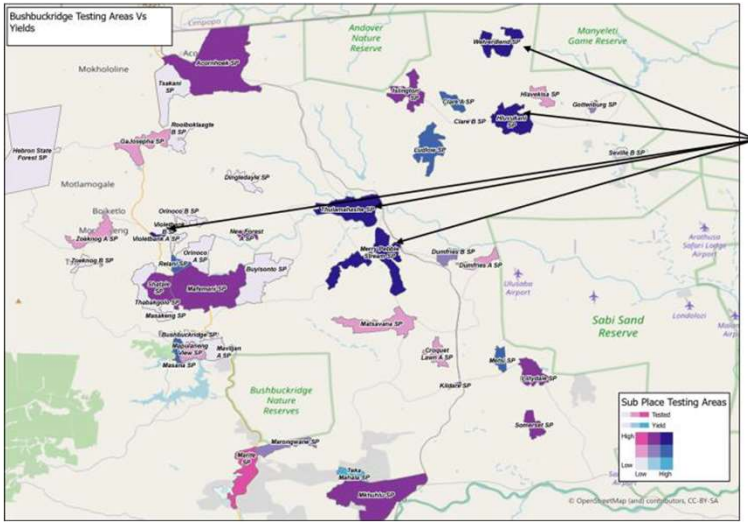
Data driven analyses supports identification of potential high yield areas

The Thulamahashe CHC is within the top 25% of those facilities for Positive HIV Tests

These are the two main areas where testing should be focused

- The on section is located at the Thulamahashe Old Stadium
- The second is the Cashbuild Mall

Both Rolle and Merry Pebble Stream (Highlighted in slide 3) are close to this area



Areas where we see a high number of testing and a high yield i.e. Where testing should be focused

- Thulamahashe
- Merry Pebble Stream
- Violet Bank
- Hluvukani
- Welverdiend

- Analysed community testing data to determine where we still see potential for high yield testing – thus prioritising team deployment

Facility vs Community Testing Geo analyses inform where to deploy resources.

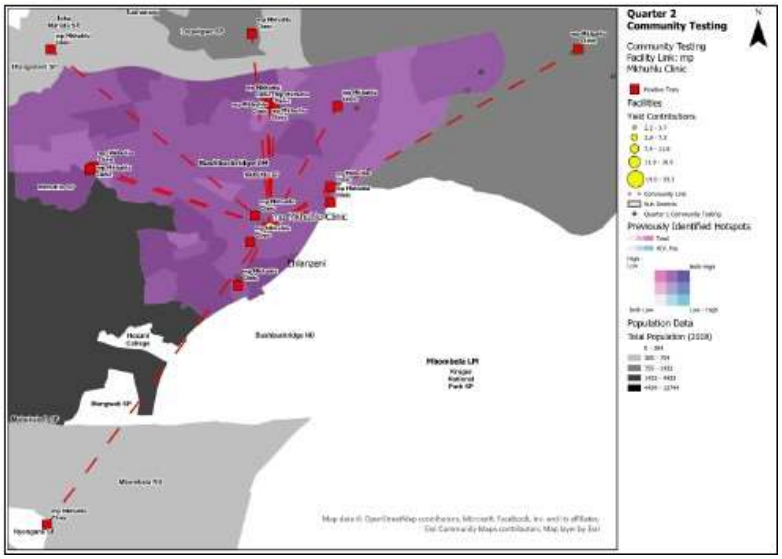
Mkhulu

The Quarter 2 community testing saw a yield of 10.3% while the facility-based testing was at 3.8%. The team should continue their testing program in the surrounding areas.

Suggested testing areas include inter alia;

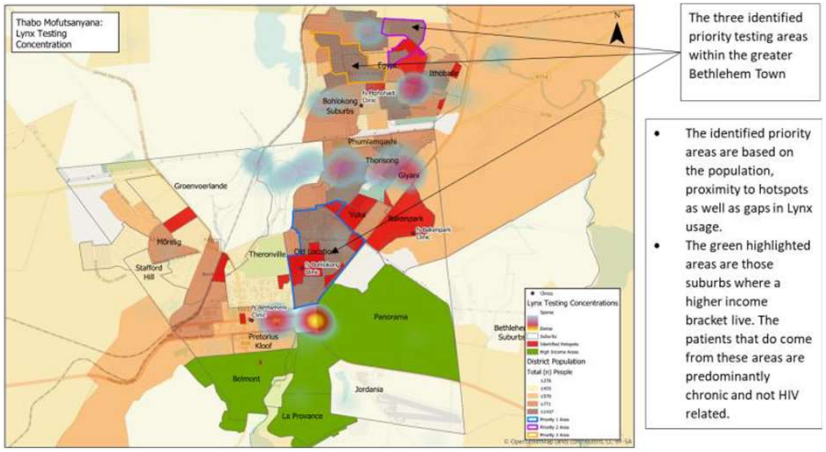
- Legokgwe
- Mkhulu
- Hlanganani
- Teka Mahala

The facility also saw in increase in 9 TB cases during Quarter 2 so more screening for presumptive's should be done during their community testing strategies.



- How does the clinic results compare to the community testing results?
- Should testing and treatment programs be continued in the area or should resources be deployed else where?

Participatory Mapping strengthens targeting of Community Testing areas



The three identified priority testing areas within the greater Bethlehem Town

- The identified priority areas are based on the population, proximity to hotspots as well as gaps in Lynx usage.
- The green highlighted areas are those suburbs where a higher income bracket live. The patients that do come from these areas are predominantly chronic and not HIV related.

"In its broadest sense, participatory mapping means creation of maps by local communities"
We use participatory mapping to :

a) Understand how health facilities perceive their population
b) Where is the catchment?
c) Where are the Key Populations?
d) Where has community testing been done?
e) Additional 3rd party data is then overlaid to get a better picture

Saturation analysis guides deployment of resources and identification of gaps

Background

- Finding PLHIV is becoming an uphill task resulting in high testing rates and low yield, the low yield may suggest limited targeted testing or saturation.
- Saturation in terms of HIV testing is reached when all the PLHIV within a community have been tested and know their status.

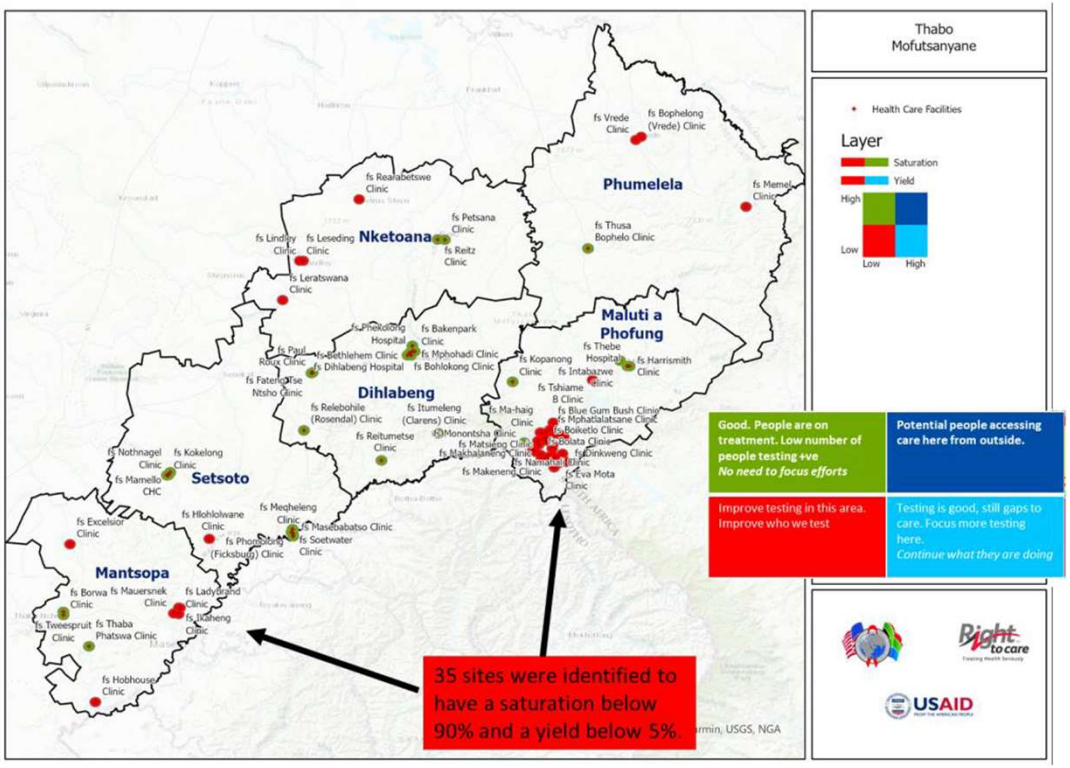
The following were our specific objectives;

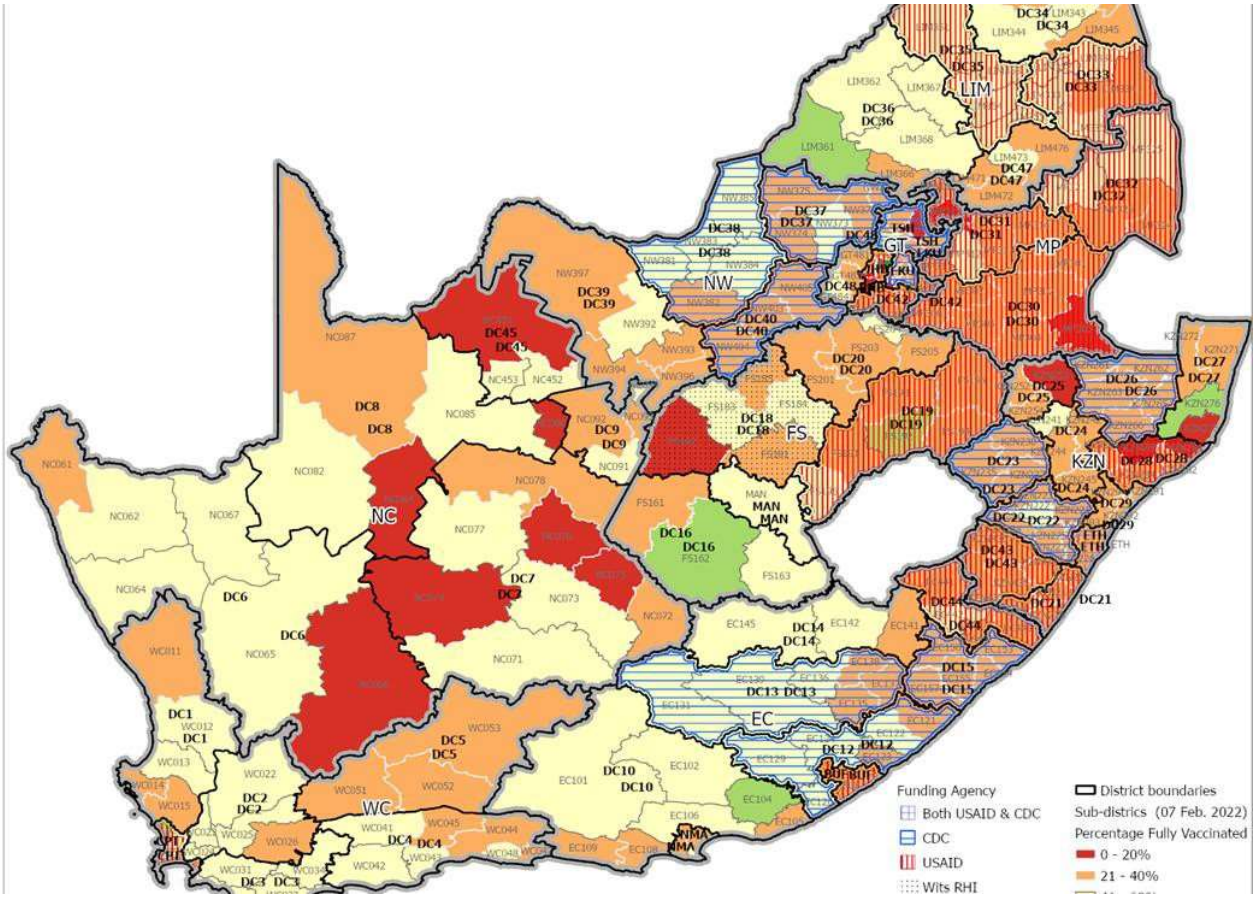
- Perform HIV testing saturation analysis
  Identify facilities that have considerably lower TX_CURR than the Naomi estimates yet obtaining lower testing yield
- Highlight for intervention toward the improvement of HIV testing strategy

Saturation Yield and legend Interpretation

- Yield calculations = HIV Positive/ HIV Tests
- Calculated at facility level then combined per facility clusters

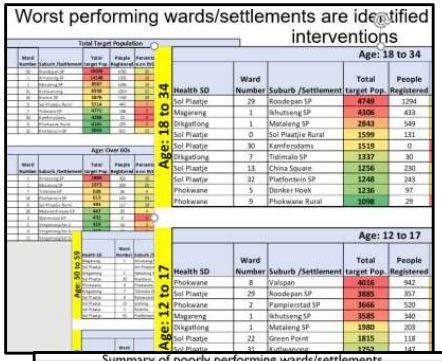
	Low Yield Yield < 5%	High Yield Yield >= 5%
High Saturation TX_CURR/PLHIV > 90%	Good. People are on treatment. Low number of people testing +ve *No need to focus efforts*	Potential people accessing care here from outside.
Low saturation TX_CURR/PLHIV < 90%	Improve testing in this area. Improve who we test	Testing is good, still gaps to care. Focus more testing here. *Continue what they are doing*

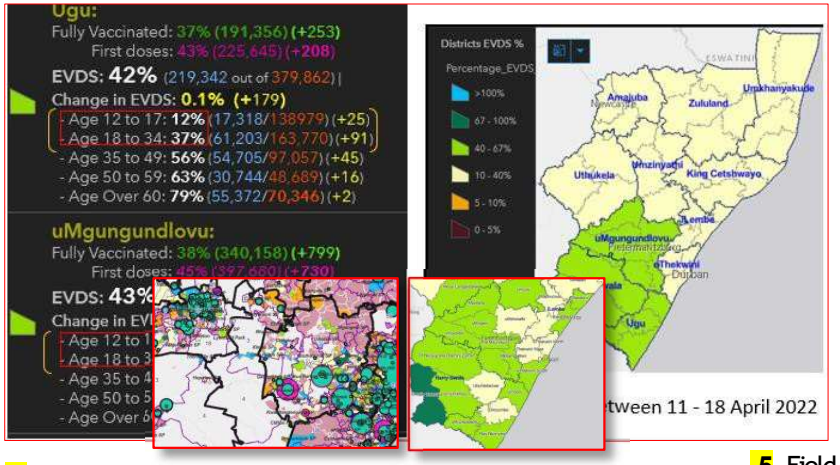




Example 2:

Supporting Covid19 Vaccination using GIS





1. GIS dashboards: help understand coverage at local level, monitor weekly progress at settlement & ward level

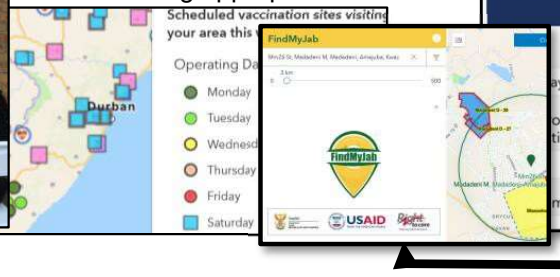
2. Use GIS dashboards and printed maps to conduct micro- level planning, population segment targeting & planning of ideal outreach locations

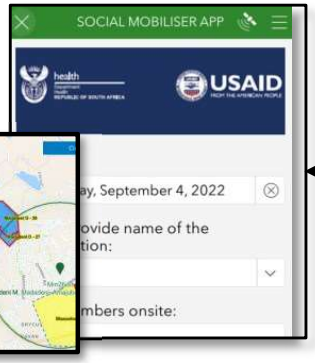
3. Ramp up targeted interventions e.g., Demand Creation using appropriate tools

4. Vaccinate in Identified critical wards & settlements

5. Field/survey to capture and monitor direct vaccination daily

GIS tools are linked for strengthened implementation and better results





Mobile app/tool for supporting social mobilization

A mobile public facing app/tool for finding nearest vaccination sites

Some data Limitations to consider

1. Data access limits due to Protection of Personal Information legislations
    - limits the geo analyses that can be done.
2. High population mobility distorts “geo mapped” picture.
3. GIS Data quality gaps (incompleteness, currency, etc)
4. Data linkage challenges e.g. vaccination data vs registration data

Use of GIS to support Targeted and Enhanced Programming- A Practical Demonstration

Files:

Presentation 6: Data file 1- SocialMobilizerApp_Data-eThekwini

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